ACRP

REPORT 41

AIRPORT COOPERATIVE RESEARCH PROGRAM

Sponsored by the Federal Aviation Administration

Guide to the Decision-Making Tool for Evaluating Passenger Self-Tagging

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AIRPORT COOPERATIVE RESEARCH PROGRAM

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Guide to the Decision-Making Tool for Evaluating Passenger Self-Tagging

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. The primary participants in the ACRP are (1) an independent governing board, the ACRP Oversight Committee (AOC), appointed by the Secretary of the U.S. Department of Transportation with representation from airport operating agencies, other stakeholders, and relevant industry organizations such as the Airports Council International-North America (ACI-NA), the American Association of Airport Executives (AAAE), the National Association of State Aviation Officials (NASAO), and the Air Transport Association (ATA) as vital links to the airport community; (2) the TRB as program manager and secretariat for the governing board; and (3) the FAA as program sponsor. In October 2005, the FAA executed a contract with the National Academies formally initiating the program.

The ACRP benefits from the cooperation and participation of airport professionals, air carriers, shippers, state and local government officials, equipment and service suppliers, other airport users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

Research problem statements for the ACRP are solicited periodically but may be submitted to the TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

Once selected, each ACRP project is assigned to an expert panel, appointed by the TRB. Panels include experienced practitioners and research specialists; heavy emphasis is placed on including airport professionals, the intended users of the research products. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, ACRP project panels serve voluntarily without compensation.

Primary emphasis is placed on disseminating ACRP results to the intended end-users of the research: airport operating agencies, service providers, and suppliers. The ACRP produces a series of research reports for use by airport operators, local agencies, the FAA, and other interested parties, and industry associations may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by airport-industry practitioners.

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The members of the technical panel selected to monitor this project and to review this report were chosen for their special competencies and with regard for appropriate balance. The report was reviewed by the technical panel and accepted for publication according to procedures established and overseen by the Transportation Research Board and approved by the Governing Board of the National Research Council.

The opinions and conclusions expressed or implied in this report are those of the researchers who performed the research and are not necessarily those of the Transportation Research Board, the National Research Council, or the program sponsors.

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FOREWORD

By Marci A. Greenberger
Staff Officer
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ACRP Report 41: Guide to the Decision-Making Tool for Evaluating Passenger Self-Tagging provides the information and tools, included on accompanying CD-ROM, necessary for an airport or airline to determine the appropriateness of pursuing passenger self-tagging should it be allowed in the United States in the future. The tools, in an Excel Spreadsheet format, allow for the input of airport-specific information, such as facility size and passenger flows, while also providing industry averages to assist those airports and airlines that haven't yet collected their individual information. The decision-making tools provide both qualitative and quantitative information that can then be used to assess if passenger self-tagging meets organizational needs or fits into their strategic plan.

While passenger self-tagging is not yet in place in the United States, the Transportation Security Administration (TSA) has indicated openness to the concept and has allowed it for selected flights from Montréal into the United States. In fact, the TSA recently approved the start of pilot programs for passenger self-tagging in the United States. The selected airports and airlines have begun the planning phases, and are expected to begin the actual pilots this year or next. These decision-making tools will assist airports and airlines in considering participation in the self-tagging.

Passenger self-tagging is the next step in the evolution of self-service passenger processing that has included self-service kiosks, web-based check-in, and "mobile" boarding passes. Both airports and airlines seek ways in which to use their resources in the most efficient manner possible, including terminal capacity. Passenger self-tagging is an evolution of self-service processing, which can allow for better utilization of terminal space and resources for airlines.

There are several perceived and real benefits that can be derived from passenger self-tagging. An increase in customer satisfaction can be one area as self-tagging can decrease the processing time. Under ACRP Project 10-07, Barich, Inc. was retained to develop a decision-making tool that can be used by both airports and airlines. The research team reviewed the current state of knowledge and practice of passenger self-tagging in both foreign and domestic airports. They conducted interviews with both airlines and airports and identified the variables that should be considered in a benefit-cost analysis. The outcomes of the research are the two decision-making tools that can be used by airports and airlines to assess self-tagging and a checklist of next steps to move toward implementation.

AUTHOR ACKNOWLEDGMENTS

The research discussed in this report was performed under ACRP Project 10-07, "Decision-Making Tool for Evaluating Passenger Self-Tagging," by a research team of recognized experts in airport passenger processing and technology solutions. Barich, Inc., was the primary research consultant. Francis Barich, president of Barich, Inc., was the principal investigator and Justin Phy, vice president at Barich, Inc., was the project administrator. The other authors were Rick Belliotti, vice president at Barich, Inc.; Ron Hiscox, principal at Airport Process Design, Ltd.; Rose Agnew, principal at Aviation Innovation, Inc.; and Pam Bell, project researcher at Barich, Inc. Providing technical writing and final graphics of the final report were Marc Gartenfeld and David Van Akkeren. Finally, special acknowledgment is given to Larry Kertz of SITA Application Services and Herve Muller, vice president and general manager of IER, Inc., who provided their time and services during the research phases of the project.

The research team would like to express its gratitude to the members of the project panel for their insightful comments and input throughout this research project. The research team would also like to thank the staff at the Seattle-Tacoma International Airport and the Des Moines International Airport for their participation in the verification of the tools presented in this report. In addition, the following airlines, airports, associations, and agencies provided key contributions through case studies and interviews, for which the research team is very grateful:

- Airports: London Heathrow Airport; Montréal Pierre Elliott Trudeau International Airport; Toronto Pearson International Airport; Vancouver International Airport; Dublin Airport; Stockholm-Arlanda Airport; Amsterdam Airport Schiphol; Geneva International Airport; Auckland Airport; Wellington International Airport; and Christchurch Airport.
- Airlines: Air Canada; WestJet; American Airlines; Lufthansa; Air France; KLM; Aer Lingus; SAS; and Air New Zealand.
- Regulatory Agencies: Transportation Security Administration (TSA); Civil Aviation Authority (CAA); Department for Transport (DfT); and Transport Canada (TC).
- Industry Associations: American Association of Airport Executives (AAAE); Airport Consultants Council (ACC); Airports Council International (ACI); Air Transport Association (ATA); and International Air Transport Association (IATA).

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

SUMMARY

Guide to the Decision-Making Tool for Evaluating Passenger Self-Tagging

ACRP Report 41 was developed as part of ACRP Project 10-07 and is a companion to the Decision-Making Tool for Evaluating Passenger Self-Tagging on the CD-ROM bound into this report. The report and tool complement the work underway by the International Air Transportation Association (IATA) and the Airport Council International-North America (ACI-NA) to produce a passenger self-tagging implementation guide. This report and tool will help United States (U.S.) airports and airlines evaluate the progress of self-tagging, as TSA-supported pilot programs are expected to begin in late 2010 to 2011. In preparing this report, every effort was made to present the material in a simple, easy-to-follow style. Readers (and ultimately users) of this report should be able to

- Achieve a good understanding of the passenger self-tagging process,
- Gain knowledge as to the various means and methods being tested,
- Receive a customized objective analysis of the impacts and benefits of passenger self-tagging,
- Obtain information to help make a business case document for passenger self-tagging much more valuable and quantitative, and
- Produce concrete results regarding the planning for self-tagging.

This report provides detailed analysis of the three process steps surrounding passenger self-tagging. These steps include when passengers (1) enter the airport, (2) proceed to self service check-in, and (3) continue through baggage drop off and baggage acceptance. This report also provides guidance on issues related to off-site check-in, baggage handling, and passenger flow analysis at resultant process points, such as at security checkpoints.

This report enables readers to educate themselves on the background of passenger self-service and with the issues and opportunities of passengers self-tagging. Chapter 1 provides a historical look at the evolution of passenger self-tagging, along with a brief analysis of how the passenger self-tagging process relates to common use and exclusive use processes. Chapter 2 provides a detailed summary of the research approach taken by the team to obtain and validate existing passenger self-tagging processes throughout the world. Chapter 3 includes a synthesis of the research findings. Chapter 4 includes a listing of the next steps for readers to consider in evaluating the viability and implementation of a passenger self-tagging process. A detailed listing and description of all research findings can be found in Appendix A to this report, available as Web-Only Document 10 at http://www.trb.org/Main/Blurbs/164162.aspx.

The conclusions or results of this research were the development of the Decision-Making Tool, which helps readers to actively and effectively make self-tagging decisions. Included in Chapter 5 of this Report is a user guide for the Decision-Making Tool. The companion to this report is the CD-ROM bound within containing the spreadsheet tools that make up the Decision-Making Tool.

The Decision-Making Tool comprises two specific spreadsheet components: the Assessment Tool and the Simulation Tool.

- The Assessment Tool provides qualitative information required to understand the scope of the potential self-tagging initiative. It also allows users to input data that describe an airport's unique characteristics, business drivers, and operating environment and produces an Assessment Report that details the appropriate strategies, prerequisites to implementation, and pros and cons of self-tagging.
- The Simulation Tool provides users with quantitative information required to understand the impact of the potential self-tagging initiative on passenger processing. It allows users to input data that describe the specific passenger processing environment to be simulated, including processor throughput times, resource availability, flight information, passenger demographics, and physical space allocation.

Also included on the CD-ROM is an audio/visual user guide tutorial for the Decision-Making Tool.

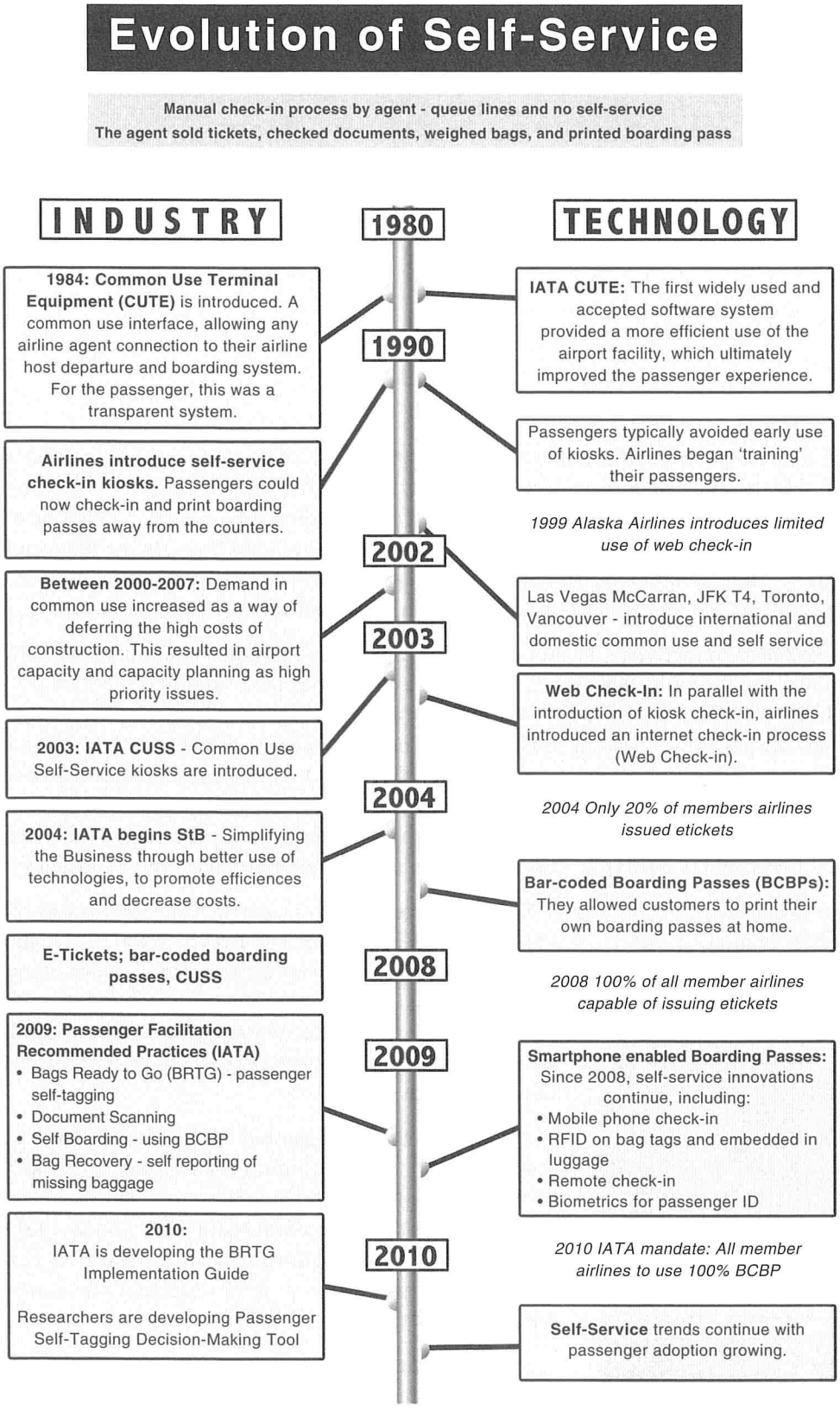
Intended Audience

This report and Decision-Making Tool are designed to help the airport community assess the impact and benefits of self-tagging. It addresses many different subjects and specialties, such as planning, finance, operations, and airport systems. It is intended to be shared across different departments, enabling the various responsible parties to contribute. The subjects are organized and presented to facilitate a team approach. This report and Decision-Making Tool provide a baseline/foundation for readers, who are expected to include, but are not limited to the following:

- Airport directors;
- Airport department leaders and operators;
- Airline department leaders and operators;
- Airport and airline planners;
- Aviation industry associations;
- Consultants and other specialists in the baggage handling and sortation areas and related fields;
- Regulatory Agencies responsible for setting policy, defining standards, and considering the security-related issues involved with passenger self-tagging; and
- Other aviation professionals that may be affected by the change in passenger flow resulting from passenger self-tagging, such as ground handlers and concessionaires.

Evolution of Passenger Involvement in the Self-Service Check-in Process

The evolutionary development of self-service provides an appropriate background for this report. Figure 1 presents a timeline of events that have led to the industry's current expansion of self-service trends, including, most recently, passenger self-tagging.



Note: RFID = radio frequency identification.

Figure 1. Evolution of self-service.

CHAPTER 1

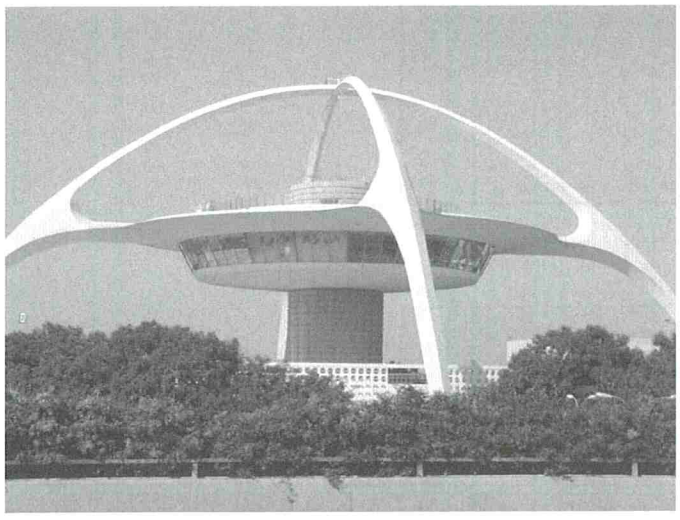
Background

Historical Overview

From the beginnings of commercial aviation until the early 1980s, the check-in process was ostensibly the same: an airline agent sold tickets, manually allocated a seat for the passenger, checked documents, weighed bags, and printed the boarding pass. Check-in could be a long process at a counter in the airport and often included waiting in long lines. In the 1980s and 90s, a degree of automation enabled the airline agent to perform these tasks more efficiently, but these improvements had little impact on the traveler in terms of waiting and processing times.

In response to increasing facility demands, common use terminal equipment (CUTE) was introduced in the mid 1980s. The first widely used and accepted common use system software was IATA's CUTE. It is known as an "agent-facing" system because it is used by airline agents to manage the passenger check-in and boarding process. Whenever an airline agent logs onto the CUTE system, the terminal is reconfigured and connected to the airline's host system. From an agent's point of view, the agent is now working within his or her airline's information technology (IT) network. CUTE allowed bag tag and boarding card printing protocols to be translated so that they could be used over shared terminals and printers at ticket counters and gates.

For the passenger, the use of CUTE is at first relatively transparent, since the passenger does not directly interact with the CUTE. However, when implemented correctly, CUTE and the other common use solutions provide a more efficient use of the airport facility, which ultimately improves the passenger experience at that particular airport. Because CUTE could be used by all airlines, it became possible to reallocate counter use, enabling the reduction of queues during peak periods.



Los Angeles International Airport.

CUTE was first implemented in 1984 for the Los Angeles Summer Olympic Games. From 1984 until the present, approximately 407 airports worldwide have installed some level of CUTE (Transportation Research Board, 2008). Today, the IATA, Airports Council International (ACI), and the ATA have all approved the replacement of CUTE with the common use passenger processing system (CUPPS).

Starting in the 90s, airlines began self-service in the form of kiosk check-in at airports as a way to avoid long queues and improve operational efficiencies. These kiosks provided the ability to relocate the check-in process away from traditional check-in counters. Passengers could check in and print boarding passes for flights in places that were previously unavailable.

At the onset however, passengers typically avoided the use of these kiosks. For the airlines, training and education of its passengers was needed to encourage kiosk use. Moving into 2000, airlines continued their trials and deployments with dedicated check-in kiosks, both in function and placement.

The late 1990s and early 2000s marked a time when airport capacity and airport-capacity planning were high priorities. Increased passenger counts at most major U.S. airports, along with increased flight activity, were causing demand for higher capacity passenger facilities. During these times, construction of new gates, concourses, and terminals were considered. It was also during these times that common use at U.S. airports began to enter more heavily into the dialogue. Many U.S. airport operators were aware of the use of common use outside of the U.S., and these strategies were starting to be considered at more U.S. airports. Airports such as Las Vegas McCarran International Airport, JFK Terminal 4, as well as Toronto Pearson International Airport, and Vancouver International Airport, were esteemed as examples of common use within North America. Those airports that implemented common use began implementation at limited locations, usually driven by international air traffic, and even began considering implementing common use in their domestic gates and terminals (Transportation Research Board, 2008).

Recognizing the expanding use of the self-service check-in kiosk, and in an attempt to help airports manage facility congestion, IATA published in 2003 the Common Use Self Service (CUSS) Recommended Practice. As per the *IATA CUSS Recommended Practice 1706c Version 1.1* (2007), the basic idea of the CUSS concept was to enable airlines to provide passenger services at a shared kiosk. Like the dedicated check-in kiosk, CUSS kiosks were typically located either at or near the check-in counters, or within queuing stations in the check-in areas, but other examples of kiosk locations included parking garages, rental car centers, and even off-site locations such as hotels and convention centers. As of February 2010, 149 airports worldwide have CUSS installed (IATA, 2010).

Las Vegas McCarran International Airport.

At approximately the same time as the introduction of kiosk check-in, airlines introduced an Internet check-in process (web check-in). Alaska Airlines was the first to offer online check-in. The system was first offered on a limited basis starting in September 1999 and was available to the general public on selected flights a month later. Web check-in is the process in which passengers confirm their presence on a flight 'online,' and typically print their own boarding passes.

This process allowed the traveler who did not have any bags to check to skip the airport check-in process and proceed straight to the gate.

Over time, airlines have expanded their offerings, both through web check-in and through self-service kiosk check-in. Today, depending on the airline and the specific flight, passengers may enter details such as meal options and baggage quantities, select their preferred seating, pay for upgrades, and other options. For the airlines, use of these self-service systems allows for a more efficient operation, with a greater ability to cope with surges in passenger numbers. The systems also lessen activity at the airport, saving airlines money and reducing passenger waiting times.

To encourage airline innovation, IATA began a program in 2004 called Simplifying the Business (StB) (IATA 2008). StB's objective was to simplify processes and better utilize technologies in order to promote efficiencies and decrease costs. Some of the initiatives in StB affected and improved the check-in process, and included

- *Electronic tickets:* This first StB initiative moved the industry from paper-based tickets to electronic tickets (e-tickets). With e-ticketing, a passenger only needs a ticket number and does not need a document issued by the airline or a travel agent to commence travel. E-ticketing began in 1994 with United Airlines. In 2004, when StB began, only 20% of all issued tickets were electronic. All airlines met the initiative and were capable of issuing e-tickets by 2008 (IATA, 2008).
- *Bar-coded boarding passes:* This second StB initiative mandated that bar-coded boarding passes (BCBP) replace magnetic stripe boarding passes and allowed customers to print their own boarding passes at home (IATA, 2008). Checking-in and printing boarding passes at home allowed a customer with no hold baggage to avoid the queues at check-in entirely by allowing the customer to proceed directly to the gate on arrival. All IATA members are mandated to use 100% BCBP by the end of 2010 (IATA 2009).

Globally, airlines are continuing to encourage their passengers to perform their own check-in, both through self-service at the airport and web check-in. Agent check-in will likely remain for those passengers who need assistance, but it is possible that they will have to pay extra for the service. For example, a growing number of airlines charge passengers if they do not use web check-in.

Current State of the Industry

Going into 2010, IATA StB [or Passenger Experience Management Group (PEMG) as the program is now called] is working on other initiatives. One of their initiatives, the Fast Travel Initiative, encourages more self-service options, both in response to passenger requests and for potential savings to the industry. The Fast Travel Initiative expands self-service options at airports, as shown in Figure 2.

These have not yet been widely implemented, but the initial goals for 2009 have been met.

Other innovations are being developed and implemented that further facilitate passenger check-in, including

- Issuance of permanent radio frequency identification (RFID) bag tags by airlines,
- Permanent RFID tags embedded in luggage,
- Remote check-in at hotels and other off-airport venues,
- Use of biometrics to identify passengers, and
- Boarding passes on mobile phones.

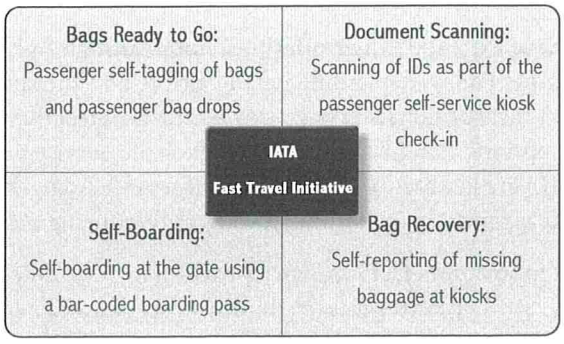


Figure 2. IATA Fast Travel initiative.

The process changes expected as a result of changes in passenger check-in are shifting further away from the original ticket counter with airline agent and the resulting queues. Tickets and boarding passes are no longer controlled documents and can be printed by the passenger at home, or even presented on a mobile device. As time progresses, it is expected that passenger check-in processes will continue to move off the airport through technologies and processes such as increased web check-in and remote check-in facilities.

Bag tags are also moving toward being uncontrolled documents, so that they may be self-applied at the airport, or, eventually, printed at home. One innovation activates the bag tag only when the bag is inducted into the baggage system, allowing positive match of passenger with the bag. Other measures include reconciliation of the passenger and the bag before departure.

The ACI-NA Working Group, in cooperation with the IATA Bags Ready to Go Working Group, continues to drive the standards and guidelines for passenger self-tagging. Through the joint effort of IATA and ACI-NA, key documents such as the Recommended Practice 1701f, *Self Service Baggage Process,* version 1, have been prepared. The working groups are currently focusing their attention on the preparation of an Implementation Guide and the establishment of U.S.-based airport and airline pilot programs. In support of future self-tagging pilots, the TSA is working closely with IATA and ACI-NA toward the preparation of U.S. airport and airline work plans, which is required by the TSA prior to the start of the pilot program. Many U.S. airports and airlines have voiced their support and are reviewing internal schedules in order to move forward (IATA, 2009).

It appears as though U.S. airports and airlines will begin passenger self-tagging pilots by the end of 2010. Supporting this effort, IATA is working toward a mid- to late-2010 release date for version 1 of its Implementation Guide. A primary goal of both the Implementation Guide and pilot program is to establish a consistent approach to passenger self-tagging implementations, such that the TSA can support future, permanent U.S. airport installations. In full support of this effort, the TSA is participating in planning meetings with IATA and ACI.

Also during 2010, TRB funded and organized the production of this project, *Decision-Making Tool for Evaluating Passenger Self-Tagging,* which has lead to this report. The timing not only coincides well with the passenger self-tagging planning and implementation work currently under way by leading aviation associations, but it also builds on these efforts by providing users with the support tools necessary to make informed decisions. In doing so, this report incorporates the most recent and relevant passenger self-tagging information into the Decision-Making Tool provided with the report.

Passenger Self-Tagging Implementations—Common Use or Exclusive Use

Passenger self-tagging, by itself, does not dictate the need for common use. The process steps between an exclusive use and common use environment are essentially identical from a passenger's standpoint; however, the various airline and airport procedural requirements create differences from a passenger processing perspective. The main passenger process steps are self-service kiosk check-in, baggage induction (bag validation and bag drop), and baggage sortation. While each airline has different check-in procedures that affect how the kiosk applications are written, the key differences between

JFK—Terminal 4.

various airline and airport procedural requirements reside at the point of baggage induction and the baggage sortation process, for example:

- In a purely exclusive use environment, where the bag drop and baggage system are controlled or used by a single airline, an airline employee assumes the responsibility of weighing a bag, activating a bag tag, and supervising the induction of the bag into the baggage system. At that point, the bag is processed according to the specific airline's sortation rules.
- In a purely common use environment, where the bag drop and baggage system are controlled by the airport and configured for use by multiple airlines, an airport employee or authorized agent assumes the responsibility of weighing a bag, activating a bag tag, and supervising the induction of the bag into the baggage system.

Along with these key differences, there are implementation variations where common use and exclusive use models co-exist, resulting in a potentially complicated process environment. Examples include

- Common use installed for the self-service kiosks only with the remaining process steps exclusive use;
- Common use installed for the agent check-in positions only with the remaining process steps exclusive use;
- Common use installed for both, self-service and agent check-in, with baggage induction exclusive use;
- Common bag drop installed, with exclusive use check-in areas; and
- Varying combinations of the above.

While this basic check-in process is the same for all airlines, there are varying procedures that each airline may require. For example, one airline may require airline employees be physically involved in the baggage induction process, while another airline is comfortable allowing the airport to provide the staff necessary to maintain and operate the baggage induction process. Another example of varying procedures is the differing rules for excess and overweight baggage charges by each airline. A common use bag drop must be capable of accommodating all airline rules and procedures. A key challenge here is that airport employees or authorized agents must be able to process baggage for differing airlines using each airline's rules and procedures for baggage handling.

Along with varying procedures, there are also technical differences to consider and potentially resolve. For example, if the self-service kiosks are common use, there may be a need to develop a workaround for airlines operating on common use self-service kiosks that do not have bag-tag printing capability. For common bag drops, technical issues include supporting multiple airline business processes, such as baggage limits, fees, and handling priority.

The other technical process difference is seen at the self-service kiosk. For common use, the industry primarily uses IATA CUSS standards. CUSS supports the self-tagging technical requirements, such as bag-tag printing. Most U.S.-based airlines, however, have not added bag-tag printing functionality to their kiosk applications, which impacts both exclusive use and common use environments. In an exclusive use kiosk, the airline will determine when and if bag-tag printing functionality will be added. In a common use self-service environment, if the airport chooses to implement self-tagging, then the airport (or airline) may have to develop a technology work-around to provide the self-tagging functionality for the airlines that are operating on that kiosk, until such time as the airlines add functionality to its host applications. This work-around usually involves intercepting the print stream requests, creating baggage sortation messages (BSMs) and developing a process that allows the BSMs to be "inactive" until such time as the bag tags are activated into the sortation system. Generally, these work-arounds are complex and can be prone to defects.

After the bag has been accepted, the common use baggage system must process each bag based on the different sortation rules for each airline. These rules can be further complicated based on differing security regulations for the same airline's baggage depending on the departing airport and baggage destination. This necessitates a sortation system capable of scanning, screening, labeling, weighing, and diverting bags based on programmable sets of rules that are specific to each airline.

One final characteristic distinguishing common use from exclusive use is the impact to rates and charges, and the overall business case.

CHAPTER 2

Research Approach

Introduction

Passenger processing continues to shift toward the increased use of self-service. One area in particular that has gained global interest is passenger self-tagging. In fact, airports and airlines in Canada, Europe, New Zealand, and other parts of the world have already conducted pilot tests and actual installations. Results from these early installations have demonstrated that self-tagging provides a multitude of benefits to passengers, airlines, and airport operators. Even so, self-tagging has proven to be a complex process, as it affects multiple systems and processes in airports, including

- Airline check-in;
- Watchlists and advance passenger data;
- Self-service kiosks;
- Baggage drop-off, sortation, reconciliation, and screening;
- Contractual and commercial issues; and
- Passenger security screening/processing.

Despite the complexity, airlines and airports have considerable interest in developing passenger self-tagging, and there are several projects presently under way outside of the U.S. In the U.S., there is a developing interest in self-tagging, including voiced support from the TSA. Responding to this growing trend, solution providers are developing various technologies to meet the needs of the processes being tested and installed. Results from these efforts are providing valuable feedback regarding the benefits of self-tagging, as demonstrated in Figure 3.

While recent airport case studies convey positive results, these installations have presented hurdles that must be overcome. In the U.S., these challenges include

- U.S. regulatory policies require that airline employees or authorized airline representatives place baggage destination tags on checked baggage. These tags must be placed on bags at the point of acceptance.
- The TSA has voiced concerns related to the implementation and security impact self-tagging may impose.
- There are complexities regarding the application of the bag tag: many passengers complain of the difficulty with applying the bag tag properly and in at least one instance, complaints were frequent enough for the airline to discontinue their effort with self-tagging.

Even with these issues, industry leading associations, such as the IATA and the ACI-NA have recognized the tremendous opportunities that self-tagging provides, and have sanctioned working groups to investigate the business reasons for benefits and risks associated with passenger self-tagging. These working groups are helping to direct the progress of passenger self-tagging in a positive direction. Recent effort by both working groups has resulted in the completion of the

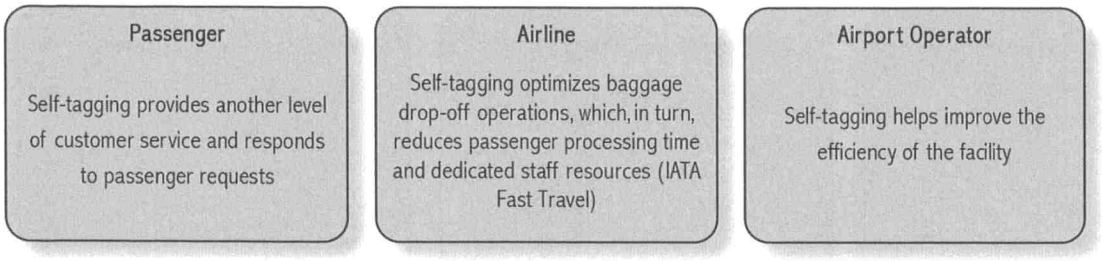


Figure 3. Benefits of self-tagging within the aviation industry.

IATA Recommended Practice 1701f, *Self Service Baggage Process,* version 1. Currently, both working groups are collaborating on the preparation of a self-tagging implementation guide and have received support from the TSA towards starting pilot programs here in the U.S.

Approach for Assessing and Verifying the Passenger Self-Tagging Process

The research approach, as shown in Figure 4, was centered on a three-old directive: (1) Establish a cooperative effort with industry associations already investigating self-tagging; (2) Establish a body of knowledge on the subject matter and working relationships with the airports and airlines that are implementing solutions; and (3) Analyze the various solution opportunities.

In support of the research conducted, on-site case studies and interviews were performed at airports with varied degrees of passenger self-tagging installations. The airport sites, which were representative of installations found in Canada, Europe, and New Zealand, included

- London Heathrow Airport,
- Montréal Pierre Elliott Trudeau International Airport,
- Toronto Pearson International Airport,
- Vancouver International Airport,
- Dublin Airport,
- Stockholm-Arlanda Airport,
- Amsterdam Airport Schiphol,
- Geneva International Airport,
- Auckland Airport,
- Wellington International Airport, and
- Christchurch Airport.

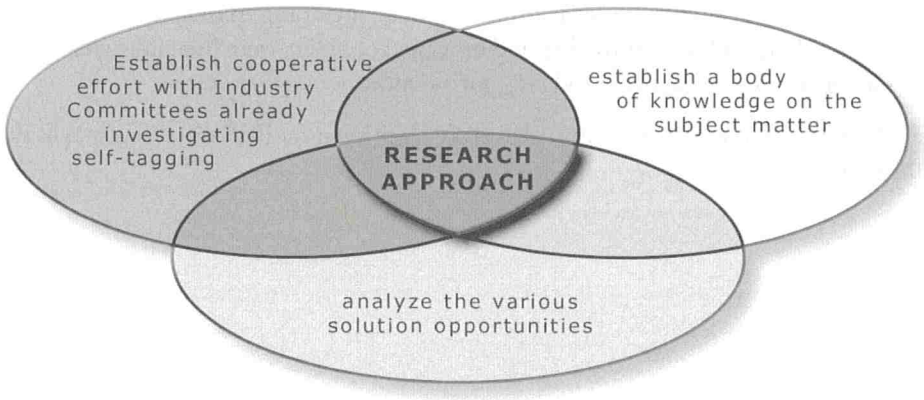


Figure 4. Research approach.

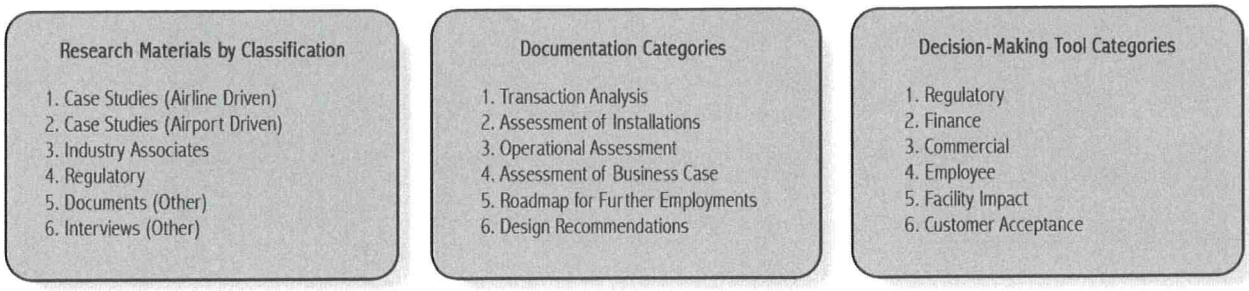


Figure 5. The research process: from collection of material to creation of the Decision-Making Tool.

The airlines interviewed at these locations included

- Air Canada,
- WestJet,
- American Airlines,
- Lufthansa,
- Air France,
- KLM,
- Aer Lingus,
- SAS, and
- Air New Zealand.

During on-site visits, researchers interviewed airport and airline staff, and facility walk-throughs were conducted. Other stakeholders, including ground handlers, solution providers, and consultants were interviewed in each of the above locations.

The research conducted is summarized in Chapter 3 of this report. To comprehensively document the entire research effort, information was first sorted into six different types of research materials by classification as shown in the first block of Figure 5. Each type of research material was then summarized and analyzed by grouping highlights of what was learned into one of six documentation categories, as detailed in block two of Figure 5.

Since passenger self-tagging is currently not conducted in the U.S., the information collected had to be verified for the applicability and transference of information to U.S. airports. During the initial tasks of this project, the research team coordinated with the ACI-NA and IATA to identify potential airports within the U.S. as candidates for field verification. Through this effort, the Seattle-Tacoma International Airport (SEA) and the Des Moines Airport (DSM) were selected as ideal candidates. During on-site verification, staff and management from all operating departments were interviewed along with local airline partners, including Alaska, American, and Continental Airlines. Local solution providers and other stakeholders were then interviewed. Finally, TSA representatives from corporate and local jurisdictions were interviewed.

Verified information was then compiled into six Decision-Making Tool categories as detailed in the third block of Figure 5.

CHAPTER 3

Findings

This chapter provides summaries of findings covering the two elements of the research process most relevant to the development of the Decision-Making Tool: the case study interviews and the verification site visits. The full analyses of these research results can be found in Appendix A. In addition, Appendix A provides detailed analyses of interviews with and documents gathered from various regularly and industry-specific sources.

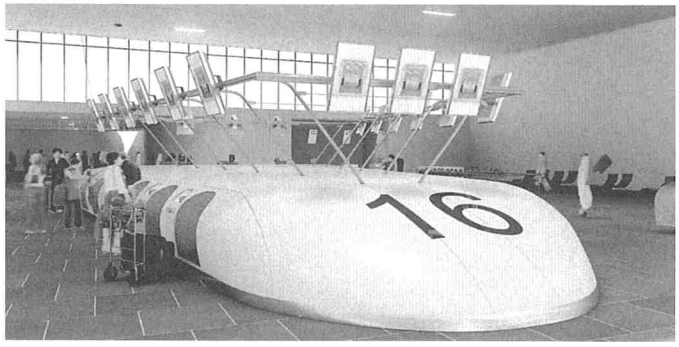
Summary of Case Study Findings

Synopsis

On-site case studies were conducted at 10 airports, involving seven associated airlines. For each case study site visit, an airline and/or host airport sponsored a set of meetings and tours at the respective airport locations. The research team typically met with strategic planning personnel, airline and airport operations and management staff, and other stakeholders. The research team also conducted airport site tours and recorded transaction analyses of the self-tagging operations. Table 1 provides a statistical comparison of each airport where case studies were conducted.

Assessment of Business Case

A variety of business cases were identified. Many airports and airlines indicated multiple motivations in pursuing self-tagging, while others indicated no clear driver. One group of business cases centered around the check-in process itself, with a focus on kiosk check-in, simplifying check-in, and expediting check-in. Another group dealt with improving customer satisfaction, which included reducing the dwell time required by the passengers, providing passengers with more flexibility in the check-in process, and catering to the desires of the airline tenants. Several issues regarding facility concerns were raised. These issues included reducing the peak congestion in the check-in lobby, making continual improvement in passenger flow, reducing the size of the check-in facility, delaying construction of capital projects, increasing the throughput of the bag drop/check-in desk, and increasing efficiency within the existing infrastructure. While not a major factor, a few believed self-tagging would provide direct cost savings through a reduction in agent staff. Finally, competition with vehicle traffic due to the proximity of airports and the length of time spent in the airport was a key factor for one airline to pursue self-tagging.



Schematic bag drop.

Table 1. Comparison of case study airports.*

Airport	Code	Annual Passengers	Airlines Using PST	Area for PST	Duration with PST
Amsterdam	AMS	47,349,319	KLM, SK,	International, (non-U.S.) Schengen (inter-Europe)	10 years
Auckland	AKL	6,576,838	ANZ	Domestic, International	2 years
Christchurch	CHC	1,592,388	ANZ	Domestic	1 year
Dublin	DUB	22,558,520	EI, SK	International, (non-U.S.) Schengen (inter-Europe)	3 years
Geneva	GVA	10,755,253	EZY, LX, SK	International, (non-U.S.) Schengen (inter-Europe)	12 years
Montreal	YUL	7,393,390	AC, WS, US	Transborder, Domestic International	8 years
Stockholm – Arlanda	ARN	13,281,542	SAS	International, (non-US) Schengen (inter-Europe)	12 years
Toronto	YYZ	18,509,624	AC,WS	Domestic, International	2 years
Vancouver	YVR	8,507,464	AC, WS	Domestic, International	2 years
Wellington	WLG	605,617	ANZ	Domestic	1 year

Note: PST = passenger self-tagging.
* *Data taken from:* ACI 2009. *Worldwide Airport Traffic Statistics, December 2008,* March 13, 2009.

Transaction Analysis

On the basis of the information gathered and the observations made, two opposing trends were seen with regard to the efficiency of transactions. On one hand, queue lines were nonexistent and passengers would consistently check-in and drop their bags in just over 2 minutes with little reliance on agent assistance. On the other hand, queue lines would build and diminish much like traditional check-in counters, and passenger check-in and bag drop times would differ greatly from 2 minutes to more than 10 minutes. Many factors were noted as being responsible for the variance in efficiencies. Key among these are passenger flow design from the kiosk to the bag drop, availability of options for passenger check-in, availability of services at the bag drop, reliance on agent staff, and attentiveness of agent staff.

Aéroports de Montréal.

Operational Assessment

Both common use and proprietary implementations were assessed, and while some specific issues were noted as being unique to the type of implementation, the vast majority of operational issues were not. One of the key differentiating factors was whether the owner's approach to self-tagging was to make it the primary check-in medium or merely to add it as an option for passengers. The more aggressive approach of making it the primary check-in medium resulted in a measurably higher level of success due to a unified effort by staff and passengers to make it successful. In contrast, when implemented as an additional option for passenger self-service, it was noted that both passengers and agents would commonly revert to the traditional check-in process as opposed to adopting the new approach. In all cases, the transition from traditional check-in to self-tagging was a challenge for agents. The

modified job function from transaction-centric to customer-centric required a significantly different skill set. This resulted in the resignation of some agents and an increase in floor managers' mentoring and coaching of the agent staff. From a business perspective, the transition often resulted in the need for fewer agents, a reduced salary requirement for the new positions, and a shorter training time for new agents.

Passenger Assessment

In general, it was noted that passengers who were likely to be frequent travelers, as evidenced by their level of comfort and familiarity with the airport, were highly accepting of self-tagging, while those who were less experienced with the overall process either required the assistance of agents or opted to check-in through the traditional counters. The availability of agent support and the approach to providing assistance, whether it be teaching a passenger how to use the kiosk or redirecting the passenger to the counter, had a direct impact on the adoption of the process by new users. At least one airline noted that, over time, as passengers learn the new system, the acceptance rate rises and processing time decreases.

Arlanda airport.

Facility and Installation Assessment

A variety of installation styles were observed with variances in the check-in alternatives, lobby layout and flow, and bag drop designs. In the most extreme cases, web check-in was not available and check-in counters were only available for special circumstances, such as re-check and irregular operations, special needs, exceptions, and premium passengers only. On the other extreme, some implementations would allow full-service passenger processing at the bag drop designated for self-tagging. In most other cases, separate areas existed for self-tagging and traditional counters, each providing that service exclusively. Lobby layout and flow had a significant impact on the efficiency with which passengers moved through the self-tagging process. Some owners indicated that they were continuing to experiment with various flow models, while others had a definite preference for a specific layout. All seemed to agree that less floor space was needed for self-tagging than would be required for the same level of processing through traditional counters. Another area of distinct differences was the bag drop design. Some installations used a simple open bag belt for passengers to drop their bag, which required no activation or screening and the bag would be weighed in the bag room. Others used a fully automated baggage induction point allowing the system to measure, weigh, and screen the baggage prior to allowing the baggage into the bag room. Most used an agent-assisted bag drop in which the agent would validate the identity of the person dropping the bag, weigh the bag, and activate the tag before sending the bag to the bag room.

Toronto International Airport.

Design Recommendations

While the implementations studied varied significantly, a few specific design elements were found to have a significant impact on the success of implementation and passenger acceptance.

Among these were a thorough understanding of the current passenger characteristics and resource requirements, implementation of a flexible baggage handling system, airport ownership and management of the baggage system and infrastructure, use of kiosks as the primary check in mechanism, location of kiosks and bag drop situated in such a way that they pull passenger traffic away from the check-in counters, collaborative planning between the airport and airlines, and use of industry standards.

Transference/Applicability to the U.S.

In general, most of the information gathered during the case studies is applicable to the implementation of self-tagging in the U.S.; however, a few specific issues have been noted that are not. Most of the issues that are not directly applicable relate to differing levels of concern regarding domestic issues in different countries. Included in these are security requirements for domestic travel, regulations regarding accessibility issues, and personal privacy concerns.

Airport—Airline Partnering

The research found that a good partnering relationship between the airport and airline was a key contributor to the success of self-tagging initiatives. Most airlines indicated a preference for installing dedicated systems but were willing to discuss the benefits of common use installations. In general, airports have been supportive of airlines installing dedicated self-tagging solutions; however, in order to support other carriers that will move to self-tagging, airports anticipate the need to provide a common bag drop.

Technical Challenges with Self-Tagging

Initially, technical challenges were experienced with many implementations; however, due to the experience of the airports and airlines with self-service kiosks, the issues were relatively minor. Some of the issues included problems with the integration of middleware with the backend systems, delays in the printing process that allowed time for a passenger who was unfamiliar with the process to walk off before retrieving their bag tags, and development of the bag tag itself.

Roadmap for Further Employments

Though case studies were conducted for self-tagging programs at varying levels of maturity, several common visions were identified that provide a sense of the general direction in which self-tagging will be moving throughout the world. First among these is the support for the establishment of an internationally consistent approach for passenger self-tagging. Second, carriers who provide self-tagging for domestic flights only are interested in expanding their self-tagging solution to international flights. With most of the case study locations, there is widespread interest in relinquishing more check-in counters in favor of self-service kiosks. In fact, new facilities are being designed around the plan for extensive use of self-tagging and reduction of check-in counter space. Also noted was that airports providing common use intend to continue adding more airlines to the self-tagging program. Finally, it was noted that there is growing interest by airlines for the installation of off-site self-tagging kiosks.

On-Site Verification Findings

With quantitative results obtained through case studies and other research, field verification of these results was then necessary to improve the quality of the final Decision-Making Tool for application within U.S. airports. Through a selection process described in Chapter 2 (Research

Approach), SEA and DSM were selected as ideal candidates. The two-fold objective of the on-site verification process was to (1) validate prerequisite information used and (2) obtain additional input to prerequisite information, if applicable.

At both locations, the research team conducted a series of interviews with airport staff and management, partnering airline staff, TSA staff, technology solution providers, and other stakeholders. During the interviews, the research team reviewed the relevant prerequisite questions and presented early versions of the Decision-Making Tool. Both airport locations provided supplemental feedback on airlines, bag tags, facilities, finance, IT, kiosks, operations, planning, legal, regulatory, and security.

In both locations, the perquisite information generally lined up with expectations of the U.S. airport locations. The research team found a much closer agreement at the larger airport site (SEA). This seemed reasonable, being that much of the information collected during the research process was also from larger airports.

At the smaller airport site (DSM), the research team noted some differences in the existing prerequisite information, along with additional information not considered at the larger airports. For example, questions arose regarding the following security-related prerequisites:

- What are the changes in legal responsibility for acceptance of baggage by the airport?
- Can the airport comply with passenger rights regarding checked bags?
- Can the airport comply with National Aviation Security Program (NASP) Section 17 requirements for hold baggage?
- Is there increased risk to the airport due to liability for impact on airline operations and liability for safety in taking over Ground Handling Services?

Using the feedback from these two airports, the research team was able to further refine existing information and add new prerequisite information to the relevant areas of the Tool.

CHAPTER 4

Recommended Next Steps for Implementation

This chapter provides a checklist for recommended "Next Steps for Implementation" toward a passenger self-tagging solution. Each step is listed in Figure 6 and discussed in detail below.

Step 1 Review and Use this Decision-Making Tool and Report

The Decision-Making Tool can be used to quantify the decision-making process (i.e., the user can address self-tagging objectively and assess specific impacts). The Tool consists of two spreadsheet components: the simulation component and the assessment component.

When using the simulation component, the quality and value of the output information is directly tied to the accuracy of the input information. For example, passenger counts throughout the day may be first input using best guess scenarios. A more accurate value obtained through time and motion studies may significantly change the estimated results and ultimately impact the space and equipment analysis portion of the Tool.

When using the assessment component, the user can establish a set of "next step" items to begin a thorough analysis of the issues at hand. For example, facility impacts may show that significant work is required in the baggage handling area to support baggage sortation requirements. Through this information, the user can also establish a detailed set of areas in which cost can potentially be a factor.

Step 2 Maintain a Current Understanding Through Industry Involvement

As discussed in this report, working groups within ACI-NA and IATA are driving the development of self-tagging standards and implementation practices. By the end of 2010, it is projected that U.S. airports will have coordinated with these working groups, as well as with the TSA, and will begin various self-tagging pilot programs. The intent of these pilot programs will be to establish a consistent process for U.S. self-tagging implementation. To stay abreast of changes and progress, any airport interested in self-tagging should make contact with the working group leads within both ACI-NA and IATA.

Another important way of maintaining a current understanding is to be aware of the industry reference documents that govern the standards, policies, and procedures for self-tagging. The technical components covered in the standards documents include hardware and application, system interfaces, messaging, and bar codes, among other items. Documents to reference include (see full references in the References section):

- *ACRP Report 10: Innovations for Airport Terminal Facilities;*
- *ACRP Report 25: Airport Passenger Terminal Planning and Design;*

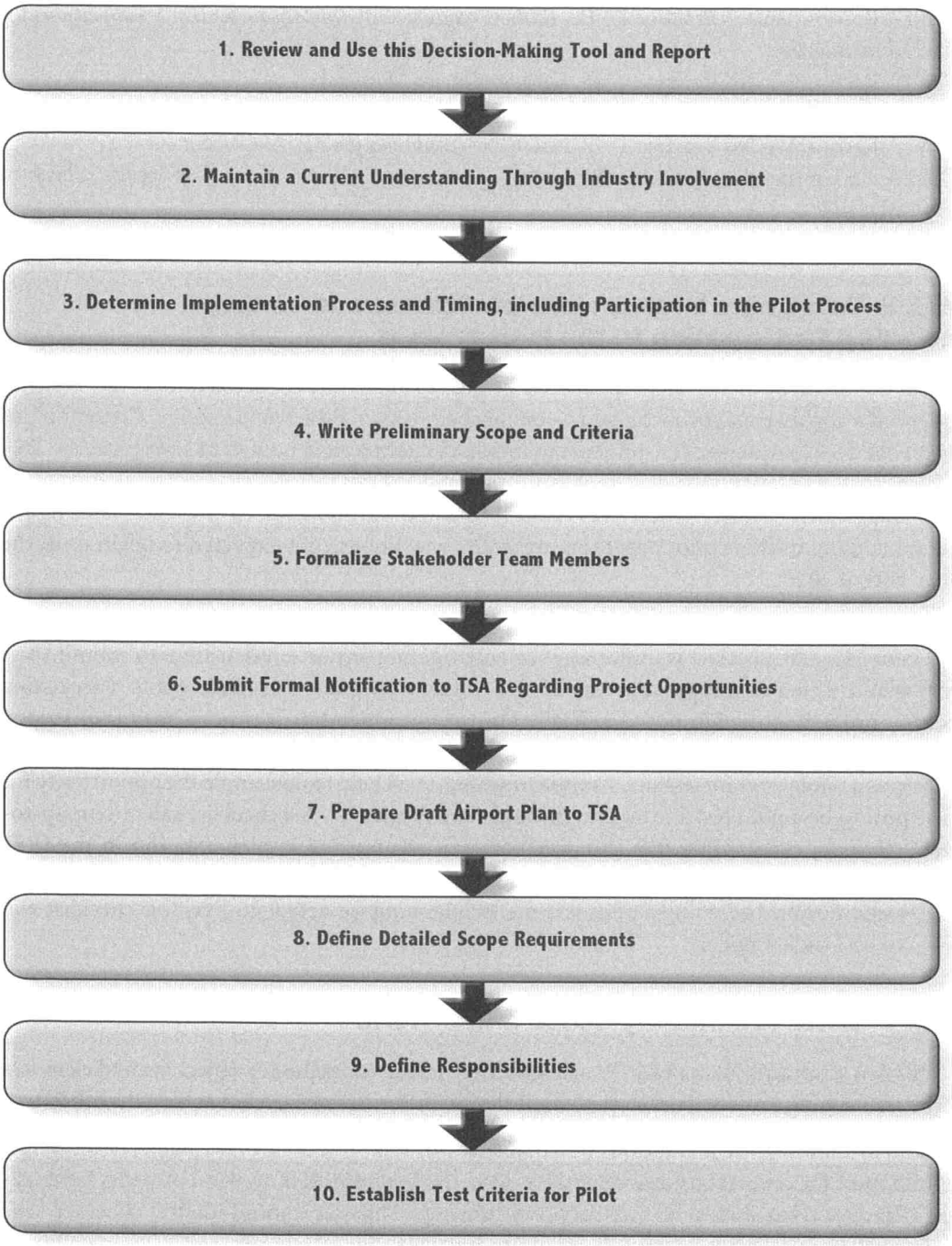


Figure 6. Next steps for self-tagging solution implementation.

- *ACRP Report 31: Innovative Approaches to Addressing Aviation Capacity Issues in Coastal Mega-regions;*
- IATA Recommended Practice, 1701f, *Self Service Baggage Process;*
- IATA 1706, *Functional Specification for Standard Departure Control System;*
- IATA 1706e, *Paper Specifications—Documents to be Printed by a General Purpose Printer (GPP) In A Common Use Self-Service (CUSS) Kiosk;*
- IATA 1724, *General Conditions of Carriage (Passenger and Baggage);*
- IATA 1740a, *Form of Interline Baggage Tag;*

- IATA Recommended Practice 1740c, *Radio Frequency Identification (RFID) Specifications for Interline Baggage;*
- IATA Recommended Practice 1745, *Baggage Service Messages;*
- IATA 1796, *Baggage System Interface;*
- IATA Recommended Practice 1797, *"CUPPS" (umbrella for AIDX, CUSS);*
- IATA Recommended Practice 1800, *Baggage Process Description for Self-Service Check-in* (Draft); and
- IATA 1008, *Glossary of Commonly Used Air Passenger Terms.*

Step 3 Determine Implementation Process and Timing, Including Participation in the Pilot Process

U.S. deployment of self-tagging systems cannot formally move forward until the TSA has approved a consistent approach and has established its own directive or policy. Current plans are for the TSA to monitor U.S. pilot programs as an aid in setting policy. At such time, the TSA will update the security policies so that as airports and airlines pursue self-tagging, they can formally adapt their security procedures to meet updated TSA policies. At present, planning for and scheduling of these pilot programs are under way but are not expected to begin until the latter part of 2010.

Currently, the time limits for which airport pilots must start and must finish have not been set. As of May, 2010, effort is under way for participating airports and airlines to submit their work plans, which are required by the TSA to obtain a temporary amendment to the existing security process. Although not specifically known, the amendment process may take several months to complete. Depending on timing and airport interest, there may be opportunity to participate as a pilot program test site. Completing Step 2 will help to determine the opportunity for an airport to be a pilot test site. Again, through Step 2, users of this checklist can obtain up-to-date information regarding the TSA acceptance of self-tagging implementation in the U.S., which will ultimately help drive the implementation schedule. Whether conducting self-tagging implementation by becoming a pilot test site, or planning for actual go-live, this checklist will prove to be a useful guide.

Step 4 Write Preliminary Scope and Criteria

This first scoping draft is a high-level document that identifies the key objectives and elements of the self-tagging project. This scoping draft should include summaries of at least the following:

Business Planning: Identify the business objectives for this project. Review Chapter 3 (Findings) of this report for general business objectives. Also, the Decision-Making Tool provides key business objectives that should be built upon in this step. This step should identify whether self-tagging will be installed in a common use or proprietary technical environment. This step should also address the initial costing issues regarding rates and charges and the airport business model. Self-tagging does create economic benefits, but also expenses, and not necessarily for the same parties, so the project success will be affected by the cost/benefit structure.

Benchmarks and Goals for Success: Goals for self-tagging should be based upon identified business objectives. Taking time to identify and quantify the goals will help to set benchmarks for success. For example, improving passenger satisfaction by reducing wait times may be an identified business objective. Understanding current wait times and expectations of the passengers (i.e., would a 5-minute reduction be enough to improve satisfaction) is then needed to set appropriate benchmarks. If data is not available on current conditions, collection of data through time and motion studies as well as interviews may be needed. The Decision-Making Tool can also be used in comparing industry averages as an initial baseline.

Process Steps: These steps define how self-tagging will occur at your facility. Process steps should include: passenger service/training, self-service kiosks, bag drop/induction points, baggage handling, routine operations and maintenance, and facility care.

Facility Impact: Evaluate facility impact based on defined process steps and potential use of space for self-tagging. This step should identify kiosk and bag drop locations, along with space requirements around the locations. The Decision-Making Tool can be used to help in understanding space impacts. Facility impact should consider all infrastructure requirements associated with the process points and facility space.

Project Management: Project management outlines how self-tagging technology should be implemented. Project management requirements should include scope definition along with initial budget and schedule.

Step 5 Formalize Stakeholder Team Members

Actual implementation of a self-tagging solution will require the cooperative effort of several stakeholders. The primary stakeholders include

- Airport representatives and champion (advocate);
- Airline partner(s), including a champion from each (station, IT, corporate);
- TSA points of contact [federal security advisor (FSD), principle security inspector (PSI), corporate]; and
- Solution providers.

Solution providers will vary depending on installation requirements, and may involve design consultants, technology hardware/software, baggage handling, IT infrastructure, paper stock, and other third party support roles.

Step 6 Submit Formal Notification to TSA Regarding Project Opportunities

Corporate TSA should be formally notified of the intent for implementation of a self-tagging system. Request should be made for corporate TSA to be the first to contact the local FSD representatives. This first notification is an information-based meeting and its primary objective is to gain a full understanding of the next steps involving the TSA.

Step 7 Prepare Draft Airport Plan for TSA

Depending on the results of the notification process, the TSA may require submission of an Airport/Airline Plan. Elements of this plan should include

- Concept of Operations: gathered from scoping process above in Step 4.
- Flow of Process: How will the passenger process be controlled through the entire system?
- Air Carrier Participation: including initial partners and interested partners.
- Minimum security requirements: Must ensure current security operations are not compromised. Should also demonstrate how self-tagging will improve security in areas such as customer identification and baggage reconciliation.
- Proposed Amendment to TSA Airport Operating Procedures: carriers to write proposed amendment. In the event of common use, the multiple airlines may submit on one proposal.
- Scenario planning through testing/pilot: identify security-related tests, including measurement criteria, use of technology, and use of TSA observations.

Step 8 Define Detailed Scope Requirements

Using the detailed findings of this Decision-Making Tool and the results of the above steps, the scope of work should be updated to include detailed information regarding the following:

- Input from TSA review: define regulatory criteria for each process step.
- Establish unique characteristics/business models of partnering airlines, including operating requirements and local regulations.
- Define IT upgrade requirements (airline/airport) for hardware, software, IT infrastructure, and IT governance.
- Consider baggage handling impact: consider the baggage handling system, sortation system, baggage status messaging, reconciliation system, and tracking system.
- Update budget and project management requirements.

Step 9 Define Responsibilities

This step involves reviewing staffing impact for airlines, airport, solution providers, ground handlers, and other stakeholders.

Step 10 Establish Test Criteria for Pilot

This final step suggests using prerequisite information from the Decision-Making Tool to establish issues or open items that will be tested during the initial phases or during participation in the pilot program. Many of these tests may be specific to the airport facility and may include tests covering industry-wide issues identified for pilot testing. For example, as noted during case study work with Aéroports de Montréal, a key test was whether the airport was able to successfully establish "physical control" around the perimeter of the self-tagging stations (refer to Appendix A for further detail).

It will be necessary to define scenarios to be tested during startup of the self-tagging process. Tests should address key items, such as benchmarks, security, and other performance issues. If the airport or airline participates in the pilot tests, additional scenario tests may be needed to help establish industry requirements.

Finally, it is important to set success measurements while evaluating opportunity and impact criteria to ensure all considerations are taken under advisement in the decision-making process.

CHAPTER 5

The Self-Tagging Decision-Making Tool User Guide

Overview

This report includes two spreadsheet tools to support the decision-making process: an Assessment Tool and a Simulation Tool. These tools address the subjective, qualitative aspects and the objective, quantitative aspects of the implementation of self-tagging. The Assessment Tool guides the user through the different subject areas and specific items that will need to be addressed in an implementation. This tool organizes the prerequisites taken into account by the reference airports and enables the user to determine which are relevant to their airport. The tool will rank and prioritize the different elements, which can help determine the complexity of the implementation and scope of the project for the airport. The Simulation Tool enables the users to input their own specific data to determine the impact of self-tagging on space, flow, and resource requirements. These impacts can be quantified and evaluated as part of a cost/benefit analysis.

The purpose of the Assessment Tool is to provide the user with the qualitative information required to understand the scope of the potential self-tagging initiative. It allows the user to input data that describes the airport's unique characteristics, business drivers, and operating environment and provides an Assessment Report that details the appropriate strategies, prerequisites to implementation, and pros and cons of self-tagging. This report is built by the ranking and prioritization of the multiple prerequisites identified in the airport site visits and industry surveys. The full list of Assessment Report content is included as Appendix C. The user can use the Assessment Tool to run reports on different implementation strategies, for example a pilot trial, single market, or full airport installation. This qualitative assessment report can be used to help scope the implementation requirements. Figure 7 shows the opening screen of the Assessment Tool.

The purpose of the Simulation Tool is to provide the user with the quantitative information required to forecast the impact of the self-tagging initiative on passenger processing. It allows the user to input data that describes the specific passenger processing environment to be simulated, including processor throughput times, resource availability, flight information, passenger demographics, and physical space allocation. This data is used to create a throughput and queue model, which shows the demand versus the capacity for processor resources over time, and a space model, which shows the variances between the current space allocation and the space requirements for the simulated environment. The model can be used to calculate the resources and space required for self-tagging and traditional check-in, as well as kiosk, rework, and bag drop-off. The user can input multiple scenarios to illustrate the impact and support a cost/benefit analysis. The Simulation Tool is not intended to provide design-level output and does not address optimum layout for improving passenger flow and congestion. Variables such as passenger dwell time, entrance points, physical obstructions, counter configurations, queue dimensions, and baggage system induction points will all affect the layout design and are beyond the scope of this product. In addition, this tool does not address the impact of passenger self-tagging

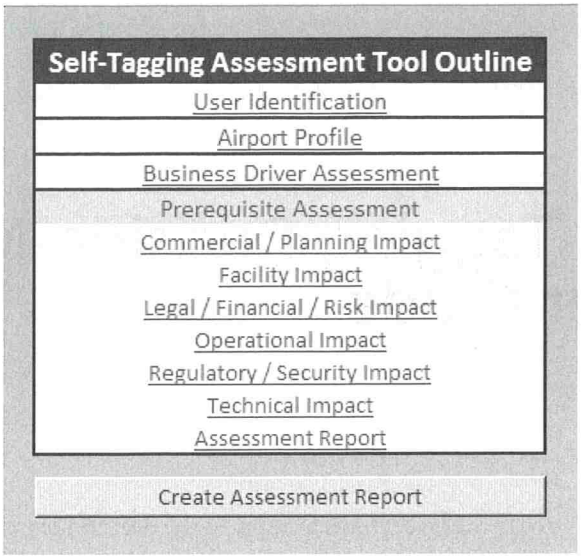


Figure 7. Self-Tagging Assessment Tool outline.

on downstream processes. In particular, concessions and the security checkpoint are likely to be affected by any significant changes in passenger throughput. It is important for the TSA and concessionaires to be included in the planning stages in order to be prepared for the changes they are likely to experience. Figure 8 shows the opening screen of the Simulation Tool.

As outlined in Figures 7 and 8, the following two sections represent User Guides for both components of the Decision-Making Tool.

Assessment Tool—User Guide

User Identification

The User Identification worksheet, as shown in Figure 9, is for documentation purposes. This sheet allows the user to input the name of airport that is being assessed, the date of assessment, the person leading the effort, and the contributors, including respective company and department affil-

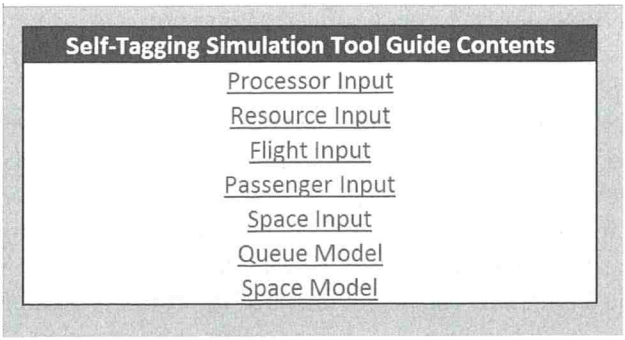
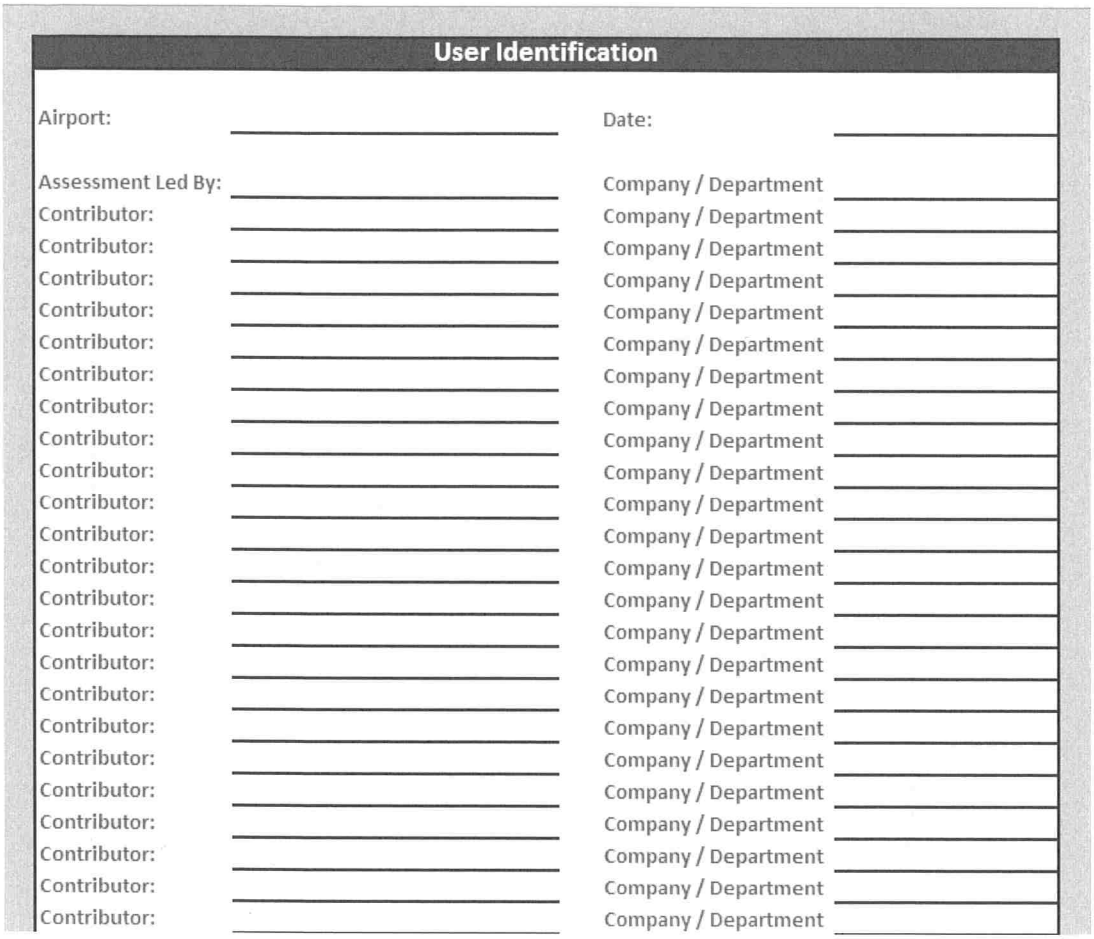


Figure 8. Self-Tagging Simulation Tool guide contents.



User Identification

Airport:		Date:	
Assessment Led By:		Company / Department	
Contributor:		Company / Department	
Contributor:		Company / Department	
Contributor:		Company / Department	
Contributor:		Company / Department	
Contributor:		Company / Department	
Contributor:		Company / Department	
Contributor:		Company / Department	
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Contributor:		Company / Department	
Contributor:		Company / Department	
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Contributor:		Company / Department	
Contributor:		Company / Department	

Figure 9. User Identification worksheet.

iations for each individual. This information is used to create the title page to the Assessment Report, which is discussed later in this Guide. The user shall type in data as appropriate.

Airport Profile

The Airport Profile worksheet, as shown in Figure 10, is designed to capture the unique mix of characteristics that make up the subject airport, namely, the airport being assessed. This sheet allows the user to select criteria from a range of categories that best describe the airport. This information is used to identify the appropriate self-tagging pros and cons for that airport. The user shall select "yes" in the drop down box for each characteristic that accurately describes the subject airport.

Business Driver Assessment

The Business Driver Assessment worksheet, as shown in Figure 11, is designed to identify the appropriate self-tagging strategy for the subject airport based on its primary business drivers. This sheet allows the user to rank a set of predefined business drivers as high, medium, or low priority. This information is used to provide the user with a description of the self-tagging strategies that will provide the biggest benefit and have the highest level of success. The user shall select the appropriate priority level from the drop down box next to each business driver.

Airport Profile Characteristics	
Check-In Mediums Offered - Check-In Lobby Area	
Airline Check-In Counters - Proprietary	Yes
Self-Service Kiosks - Proprietary	Yes
Self-Service Bag Drop - Proprietary	Yes
Agent-Assisted Bag Drop - Proprietary	Yes
Airline Check-In Counters - Common Use	Yes
Self-Service Kiosks - Common Use	Yes
Self-Service Bag Drop - Common Use	Yes
Agent-Assisted Bag Drop - Common Use	Yes
Check-In Mediums Offered - Curbside Area	
Curbside Check-In Counters - Proprietary	Yes
Curbside Check-In Counters - Common Use	Yes
Self-Service Kiosks - Proprietary	Yes
Self-Service Kiosks - Common Use	Yes
Check-In Mediums Offered - Pre-Security Airport Area	
Self-Service Kiosks - Proprietary	Yes
Self-Service Kiosks - Common Use	Yes
Check-In Mediums Offered - Off-Site Commercial Areas	
Web Check-In	Yes
Self-Service Kiosks - Proprietary	Yes
Self-Service Kiosks - Common Use	Yes
Check-In Mediums Offered - Home Use	
Mobile Phone Check-In	Yes
Web Check-In	Yes
Passenger Demographics	
Type - Business	Yes
Type - Leisure	Yes
Nationality - U.S.	Yes
Nationality - Foreign	Yes

Figure 10. Airport Profile worksheet.

Commercial Impact Assessment

The Commercial Impact Assessment worksheet, as shown in Figure 12, is designed to identify the commercial prerequisites to implementation that must be addressed to achieve a successful self-tagging program. This sheet allows the user to select the appropriate answer to a set of key questions. This information is used not only to determine the prerequisites that must be met, but also to return a breakdown of the basis for the issue, the impact it will have, the resulting action that is required, and the cost elements associated with it. The user shall select either "yes" or "no" from the drop down box next to each question.

BUSINESS DRIVERS	
Reduce Congestion and Improve Passenger Flow	High
Avoid / Defer Capital Costs	High
Improve Quality of Service to Passenger	High
Improve Quality of Service to Airlines	High
Increase Opportunities for Airlines to Add or Expand Service	High
Gain a Competitive Advantage over Other Airports	High

Figure 11. Business Driver Assessment worksheet.

Commercial / Planning Impact Assessment	
Is a common use system installed at the airport?	No
Are current airlines amenable to passenger self-tagging?	No
Is there an airline-centric working group to support the self-tagging decision-making process?	No
Are current lease agreements expiring in the near term?	Yes
Are the airlines' business drivers known?	No
Are the airlines' customer service goals with respect to queuing times in the check-in lobby known?	No
Are the airlines' business practices for handling priority passengers and exceptions known?	No
Are the airlines' current and projected passenger demographics known?	No
Are airline baggage payment and exception requirements known?	No
Are customer service requirements understood?	No
Are rules established for the use of common use kiosks in dedicated airline lease spaces?	No

Figure 12. Commercial Impact Assessment worksheet.

Facility Impact Assessment

The Facility Impact Assessment worksheet, as shown in Figure 13, is designed to identify the facility prerequisites to implementation that must be addressed to achieve a successful self-tagging program. This sheet allows the user to select the appropriate answer to a set of key questions. This information is used to determine not only the prerequisites that must be met, but also to return a breakdown of the basis for the issue, the impact it will have, the resulting action that is required, and the cost elements associated with it. The user shall select either "yes" or "no" from the drop down box next to each question.

Legal/Financial/Risk Impact Assessment

The Legal/Financial/Risk Impact Assessment worksheet, as shown in Figure 14, is designed to identify the legal, financial, and risk prerequisites to implementation that must be addressed to achieve a successful self-tagging program. This sheet allows the user to select the appropriate answer to a set of key questions. This information is used to determine not only the prerequi-

Facility Impact Assessment	
Will self-tagging be implemented in an existing facility?	Yes
Is a significant increase in enplanements expected?	Yes
Is the check-in lobby area space constrained?	Yes
Is passenger flow congested?	Yes
Are baseline measurements for passenger processing available?	No
Is the security checkpoint area currently a point of congestion that is space constrained?	Yes
Is a centralized baggage handling system with baggage sortation available where self-tagging and common bag drop are being considered?	No
Is the baggage makeup area space constrained?	Yes
Does the baggage handling system have the capacity to accommodate demand at peak operations?	No
Can the baggage handling system accommodate additional induction points?	No

Figure 13. Facility Impact Assessment worksheet.

Legal / Financial / Risk Impact Assessment	
Are there contractual requirements for airline employees at ticket counter locations?	Yes
Is the funding for passenger self-tagging adequately understood and budgeted for?	No
Are liability issues resulting from impacting airline operations properly understood?	No
Can changes be made to rates and charges to support the implementation of self-tagging?	No

Figure 14. Legal/Financial/Risk Impact Assessment worksheet.

sites that must be met, but also to return a breakdown of the basis for the issue, the impact it will have, the resulting action that is required, and the cost elements associated with it. The user shall select either "yes" or "no" from the drop down box next to each question.

Operational Impact Assessment

The Operational Impact Assessment worksheet, as shown in Figure 15, is designed to identify the operational prerequisites to implementation that must be addressed to achieve a successful

Operational Impact Assessment	
Are performance criteria, such as time and motion studies for current check-in processes, available?	No
Are check-in kiosks (airline-dedicated or common use self service) currently in use for the areas or airlines where self-tagging is under consideration?	No
Can current self-service check-in kiosks accommodate printers for bag tags?	No
Can rebooking be moved to a location away from the ticket counters, to gate lounges or other locations?	No
Are airport responsibilities for passenger rights regarding checked bags understood?	No
Does airport IT currently support operational systems for the airport?	No
Are the airline service-level requirements in supporting a self-tagging implementation known?	No
Is the number of bag tags printed for each passenger accounted for today by the airlines or airport (including unused tags)?	Yes
Are there adequate airport service management processes and on-site technical support to maintain systems and hardware (kiosks, bag drops, technology infrastructure)?	No
Are airport procedures in place to account for self-tagging during irregular operations?	No
Are there plans for off-site check-in?	No
Is the current infrastructure to support self-tagging and bag drop (i.e., building, telecom, BHS, etc.) airport owned?	No
Is there a configuration and change management process already established to track the airport's infrastructure configuration changes?	No
Can the airport support the airlines' current processes for mishandled bags?	No
Can the airport support the ADA requirements for special needs travelers in the self-tagging and bag drop implementation?	No
Can location signage for self-tagging and bag drop be clear and prominent, as well as conforming to the airports signage requirements?	No
Can the airport support presenting airlines in particular kiosk locations (i.e., are all airlines active on all kiosks, or are some blocked in particular locations) in the self-tagging implementation?	No
Do bags need to be weighed in a specific area to accommodate all airline baggage acceptance and exception requirements?	Yes
Are airline employees required to activate the bag tag in the BRS and conduct a document check?	Yes
Are locations needed for passengers to weigh and possibly repack their bags prior to approaching the bag drop?	Yes
Does the airline have requirements for specialized passenger areas (i.e., business class, rework)?	Yes
Do the kiosks need to filter out passengers with exception processing requirements?	Yes
Does the self-tagging application provide a receipt for baggage?	No
Is there a formal process for kiosk moves, adds, changes (MACs)?	No
Are criteria established to accurately measure and monitor queues?	No

Note: BHS = baggage handling system; BRS = baggage reconciliation system.

Figure 15. Operational Impact Assessment worksheet.

Regulatory / Security Impact Assessment	
Will a self-tagging implementation have a significant impact on current queue lines?	Yes
Will a self-tagging implementation have a significant impact on check-in processing times?	Yes
Is a self-tagging implementation being considered?	Yes
Has the potential of a self-tagging implementation been discussed with local and corporate TSA?	No
Are kiosks equipped with the ability to read standard forms of identification such as driver's licenses and passports?	No
Is the current baggage handling system capable of scanning and diverting bags?	No
Does the planned self-tagging bag drop have a securely controlled induction point to the baggage system?	No
Are the requirements for the passenger selectee program understood?	No
Are Payment Card Industry - Data Security Standards (PCI-DSS) understood and planned for the acceptance of credit card information at self service kiosks?	No

Figure 16. Regulatory/Security Impact Assessment worksheet.

self-tagging program. This sheet allows the user to select the appropriate answer to a set of key questions. This information is used to determine not only the prerequisites that must be met, but also to return a breakdown of the basis for the issue, the impact it will have, the resulting action that is required, and the cost elements associated with it. The user shall select either "yes" or "no" from the drop down box next to each question.

Regulatory/Security Impact Assessment

The Regulatory/Security Impact Assessment worksheet, as shown in Figure 16, is designed to identify the regulatory and security prerequisites to implementation that must be addressed to achieve a successful self-tagging program. This sheet allows the user to select the appropriate answer to a set of key questions. This information is used to determine not only the prerequisites that must be met, but also to return a breakdown of the basis for the issue, the impact it will have, the resulting action that is required, and the cost elements associated with it. The user shall select either "yes" or "no" from the drop down box next to each question.

Technical Impact Assessment

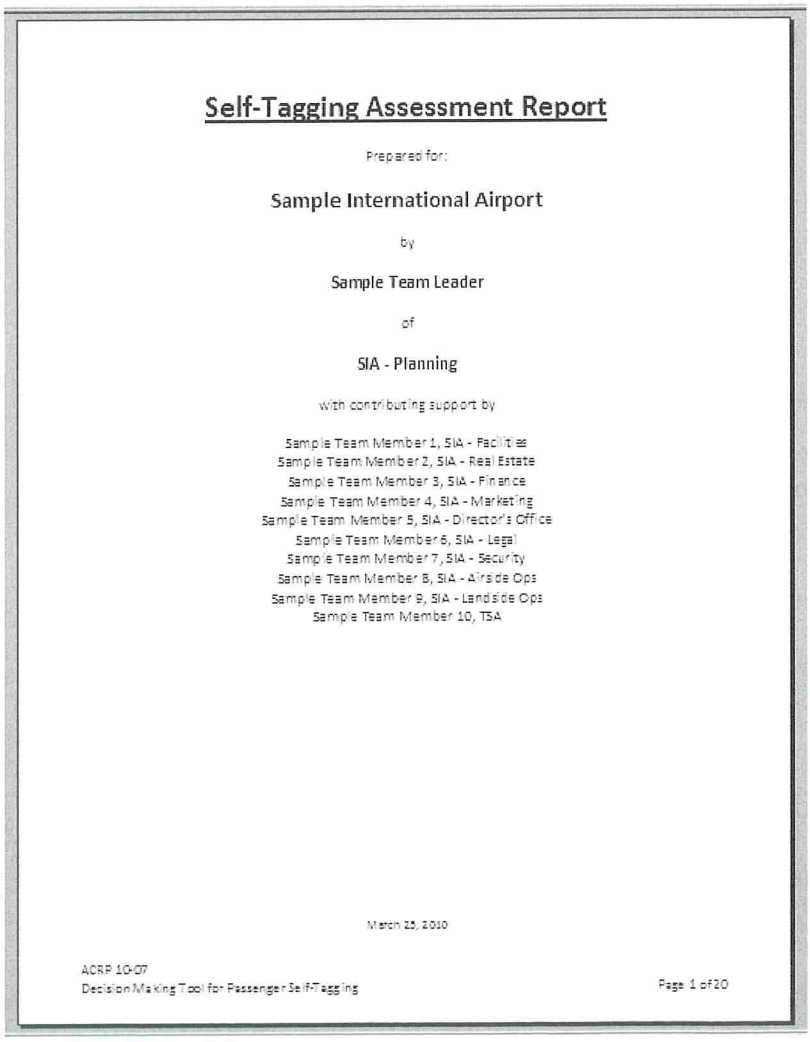
The Technical Impact Assessment worksheet, as shown in Figure 17, is designed to identify the technical prerequisites to implementation that must be addressed to achieve a successful self-tagging program. This sheet allows the user to select the appropriate answer to a set of key questions. This information is used to determine not only the prerequisites that must be met, but also to return a breakdown of the basis for the issue, the impact it will have, the resulting action that is required, and the cost elements associated with it. The user shall select either "yes" or "no" from the drop down box next to each question.

Assessment Report

The Assessment Report is the comprehensive result of each of the individual assessments. It will define the self-tagging pros and cons for the specific subject airport, the appropriate self-tagging strategies, and the prerequisites for implementation that must be met to achieve success. The Assessment Report is preformatted for printing and is automatically generated using macros. As such, when the Assessment Tool is opened, the user must select the option to enable macros. After completing each of the assessments, the user must press the "Create Assessment Report" button on the "Self-Tagging Assessment Tool Outline" tab to generate the report. Figure 18 shows a sample cover page of this report.

Technical Impact Assessment	
Are current kiosks capable of scanning 2D barcode, airline frequent flier cards, credit cards and passports to identify passenger as required by the airlines' check-in processes?	No
Are bag tags for each airline standard?	No
Can airline software support self-tagging, including printing of bag tags, active/inactive tags, BSMs, etc.?	No
Can the requirements for interface between the self-tagging system components and departure control system be accomplished?	No
Can the requirements for interface between the self-tagging system components and baggage reconciliation system be accomplished?	No
Can the requirements for interface between the self-tagging system components and baggage handling system (BHS) be accomplished?	No
Can the requirements for interface between the self-tagging system components and kiosk software be accomplished (such as with printing of bag tags)?	No
Does airport telecommunications infrastructure meet the requirements for self-tagging, including the necessary capacity, resiliency, redundancy, security, etc.?	No
If active/inactive tags are required, can the software accommodate this requirement?	No
Can the baggage reconciliation system (BRS) be used to send baggage sortation messages to identify active and inactive bags, if required?	No
Is more than one departure control system (DCS) in use?	Yes
Can the protocols and messages required between the bag drop and the departure control system be supported including the requirements for active and inactive tags, if required?	No
Are the airlines certified on the CUSS system installed at the airport?	No
Can passengers add or remove bags from the self-tagging application?	No

Figure 17. Technical Impact Assessment worksheet.



Self-Tagging Assessment Report

Prepared for:

Sample International Airport

by

Sample Team Leader

of

SIA - Planning

with contributing support by

Sample Team Member 1, SIA - Facilities
Sample Team Member 2, SIA - Real Estate
Sample Team Member 3, SIA - Finance
Sample Team Member 4, SIA - Marketing
Sample Team Member 5, SIA - Director's Office
Sample Team Member 6, SIA - Legal
Sample Team Member 7, SIA - Security
Sample Team Member 8, SIA - Airside Ops
Sample Team Member 9, SIA - Landside Ops
Sample Team Member 10, TSA

March 25, 2010

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Decision Making Tool for Passenger Self-Tagging

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Figure 18. Self-Tagging Assessment Report cover page.

Simulation Tool—User Guide

Prerequisites

A set of prerequisite tasks are required in order to obtain the necessary information that will enable the user to develop useful simulation models. When possible, accurate data reflecting the specific subject airport, airlines, and passengers should be used to provide the most accurate results. Sample values, identified through case studies and from the *ACRP Report 25: Airport Passenger Terminal Planning and Design,* are included as Appendix B for cases in which accurate data cannot be obtained (Transportation Research Board, 2010). The following steps should be performed by the user to identify the necessary information:

Step 1. Perform an audit of passenger processing throughput at each step of the check-in process by physical observation (Check-in Counter, Check-in Kiosk, Agent-Assisted Bag Drop and Rework).
   a. Document the time to process each party in seconds.
   b. Note the party size (1, 2, 3, 4+).
   c. Note any exceptions or reasons for significant delays.
   d. Calculate average processing times in seconds for each party size at each step.

Step 2. Obtain resource information for the subject area.
   a. Agent work schedule for all of the Check-In Counter and Bag Drops for a day with peak activity.
   b. Number of Self-Service Check-In Kiosks.

Step 3. Obtain flight information for all airlines serviced by the subject area on the same day for which resource information was identified.
   a. Identify airline, flight number, destination, and aircraft model for reference purposes only.
   b. Identify departure time in 24-hour format (hh:mm).
   c. Identify the amount of time prior to departure that check-in closes.
   d. Identify the amount of time prior to departure that check-in opens on-sight.
   e. Identify the number of seats available for sale.

Step 4. Obtain passenger profile information for each of the flights input in the flight profile.
   a. Identify the percentage of seats occupied on each flight.
   b. Identify the percentage of passengers on each flight that are not originating at the subject airport.
   c. Identify the percentage of local boarding passengers on each flight that are part of a party of 1, 2, 3, and 4 or more. The total must equal 100%.
   d. Identify the percentage of local boarding passengers that arrive during each of the following check-in time segments. The total must equal 100%.
      i. The earliest ⅓ of the available duration.
      ii. The midrange ⅓ of the available duration.
      iii. The latest ⅓ of the available duration.
   e. Identify the percentage of local boarding passengers that utilize each of the available check-in resources. The total must equal 100%.
      i. Traditional Check-In Counter.
      ii. Web or Mobile Check-In with No Bags (passengers who go directly to the security check-point).
      iii. Web or Mobile Check-In with Bags.
      iv. Self-Service Check-In Kiosk with No Bags (not self-tagging).
      v. Self-Service Check-In Kiosk with Bags (not self-tagging).
   f. Identify the number of local boarding passengers that require rework.

Step 5. Obtain resource quantities and the breakdown of space in square feet allocated to each.
   a. The number of Check-In Counter Positions and the area required for the agent workspace, the counter, and the passenger workspace.
   b. The area allocated for Check-In Counter Queuing only.
   c. The number of Check-In Kiosks and the area required for the passenger workspace.
   d. The area allocated for Check-In Kiosk Queuing only.
   e. The number of Agent-Assisted Bag Drop Positions and the area required for the agent workspace, the counter, and the passenger workspace.
   f. The area allocated for Agent-Assisted Bag Drop Queuing only.
   g. The total area for Non-Processing purposes, including walking traffic lanes, security, airport administration, and concessions.

Once the prerequisite information has been gathered, the user is prepared to enter the initial data into the five Input Components (Processor, Resource, Flight, Passenger, and Space). After the data entry has been completed by the user, the Simulation Tool will build two models (Queue and Space) of the current environment. As optional tools, the user can also run varying simulations by changing input values.

Processor Throughput Input (Figure 19)

1. Enter the average calculations for each party size in the appropriate cell for each check-in step.
2. For Self-Tag Kiosk, Self-Tag Application, and Self Bag Drop, use the industry average numbers from Appendix B.

Resource Profile Input (Figure 20)

1. Enter the total number of agents staffing the Check-In Counters and Bag Drop Counters during each hour throughout the day.
2. Enter the total number of Self-Service Check-In Kiosks (not self-tagging).

Flight Profile Input (Figure 21)

1. Enter the flight data for each flight.

Passenger Profile Input (Figure 22)

1. Enter the passenger profile data for each flight.

PROCESSOR THROUGHPUT				
	Party of 1 (seconds)	Party of 2 (seconds)	Party of 3 (seconds)	Party of 4 (seconds)
Check-In Counter	120	240	360	480
Check-In Kiosk	120	180	240	300
Agent-Assisted Bag Drop	90	120	150	180
Self-Tag Kiosk	150	210	270	330
Self-Tag Application	20	30	40	50
Self Bag Drop	45	90	135	180
Rework	120	240	360	480

Figure 19. Processor Throughput Input.

RESOURCE PROFILE																								
Agent Work Schedule	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	###
Check-In Counter	0	0	0	2	3	3	3.5	3	4	4.5	4	4	6.5	7	5.5	4.5	1.5	1.5	2.5	2.5	3.5	3.5	2	1
Agent-Assisted Bag	0	0	0	1	1.5	2	2	1.5	2	2	2	2	3	3.5	3	2.5	1	1	1	2	2	2	1	1
Self-Tag Bag Drop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Check-In Kiosks	4																							
Self-tagging Kiosks	0																							

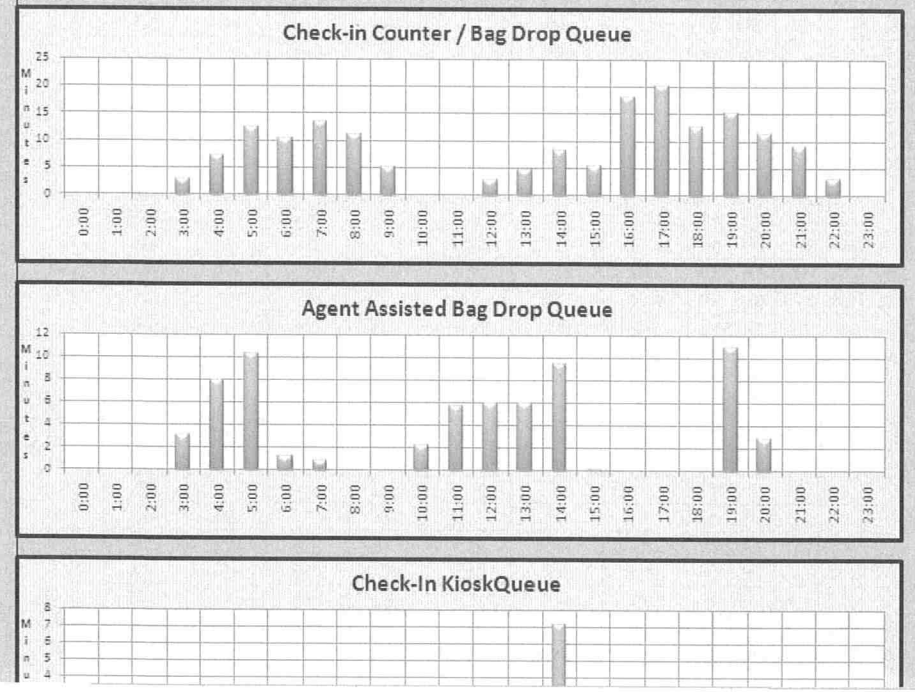


Figure 20. Resource Profile Input.

FLIGHT PROFILE							
Airline	Flight	To	Aircraft	Departure Time	Check-in Close	Check-in Open	Seats
OO	3120	MKE	CRJ-200	06:00	10	150	50
OO	3121	MKE	CRJ-200	09:50	10	150	50
OO	3122	MKE	CRJ-200	10:20	10	150	50
OO	3123	MKE	CRJ-200	14:40	10	150	50
OO	3124	MKE	CRJ-200	15:10	10	150	50
OO	3125	MKE	CRJ-200	19:55	10	150	50
MQ	2765	DWF	EMJ-145	09:40	10	120	50
MQ	2718	DFW	EMJ-145	10:05	10	120	50
MQ	2841	DFW	EMJ-145	11:05	10	120	50
MQ	2720	DFW	EMJ-145	11:30	10	120	50
MQ	4235	ORD	EMJ-145	12:05	10	120	50
MQ	4244	ORD	EMJ-145	12:35	10	120	50
MQ	3845	ORD	EMJ-145	13:50	10	120	50
MQ	4092	ORD	EMJ-145	16:25	10	120	50
MQ	3520	DFW	EMJ-145	16:25	10	120	50
MQ	3407	DFW	EMJ-145	16:55	10	120	50
MQ	3673	DFW	EMJ-145	21:30	10	120	50
MQ	4175	ORD	EMJ-145	23:05	10	120	50
EV	5576	ATL	CRJ-700	05:30	10	180	70
EV	5483	ATL	CRJ-700	14:52	10	180	70
EV	5483	ATL	CRJ-700	15:22	10	180	70
EV	5587	ATL	CRJ-700	23:25	10	180	70
RP	5016	STL	EMJ-145	06:30	15	120	50
RP	5015	STL	EMJ-145	20:40	15	120	50
CO	2568	IAH	ERJ-135	21:53	15	120	50
F8	6187	CVG	ERJ-145	15:20	15	120	50
YV	7348	ORD	CRJ-700	09:41	10	180	64
YV	7348	ORD	CRJ-700	10:50	10	180	64

Figure 21. Flight Profile Input.

PASSENGER PROFILE																
Airline-Flight	Load Factor	Transit	Party Size (100%)				Arrival Time (must total 100%)			Check-in Medium (must total 100%)						Rework
			1	2	3	4	Early Segment	Midrange Segment	Late Segment	Counter	Web / Mobile - No Bags	Web / Mobile - Bags	Check-in Kiosk - No Bags	Check-in Kiosk - Bags	Self-Tag Kiosk	
OO-3120	95%	0%	60%	25%	10%	5%	20%	62%	18%	33%	19%	19%	14%	15%	0%	5%
OO-3121	95%	5%	60%	25%	10%	5%	20%	62%	18%	33%	19%	19%	14%	15%	0%	5%
OO-3122	95%	10%	60%	25%	10%	5%	20%	62%	18%	33%	19%	19%	14%	15%	0%	5%
OO-3123	95%	10%	60%	25%	10%	5%	20%	62%	18%	33%	19%	19%	14%	15%	0%	5%
OO-3124	95%	15%	60%	25%	10%	5%	20%	62%	18%	33%	19%	19%	14%	15%	0%	5%
OO-3125	95%	15%	60%	25%	10%	5%	20%	62%	18%	33%	19%	19%	14%	15%	0%	5%
MQ-2765	95%	5%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-2718	95%	5%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-2841	95%	5%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-2720	95%	10%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-4235	95%	10%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-4244	95%	10%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-3845	95%	15%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-4092	95%	15%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-3520	95%	15%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-3407	95%	15%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-3673	95%	15%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
MQ-4175	95%	15%	65%	22%	8%	5%	17%	63%	20%	33%	19%	19%	14%	15%	0%	5%
EV-5576	95%	0%	70%	18%	9%	3%	15%	64%	21%	33%	19%	19%	14%	15%	0%	5%
EV-5483	95%	5%	70%	18%	9%	3%	15%	64%	21%	33%	19%	19%	14%	15%	0%	5%
EV-5483	95%	10%	70%	18%	9%	3%	15%	64%	21%	33%	19%	19%	14%	15%	0%	5%
EV-5587	95%	15%	70%	18%	9%	3%	15%	64%	21%	33%	19%	19%	14%	15%	0%	5%
RP-5016	95%	0%	75%	20%	5%	0%	13%	64%	23%	33%	19%	19%	14%	15%	0%	5%
RP-5015	95%	0%	75%	20%	5%	0%	13%	64%	23%	33%	19%	19%	14%	15%	0%	5%
CO-2568	95%	15%	75%	20%	5%	0%	13%	64%	23%	33%	19%	19%	14%	15%	0%	5%

Figure 22. Passenger Profile Input.

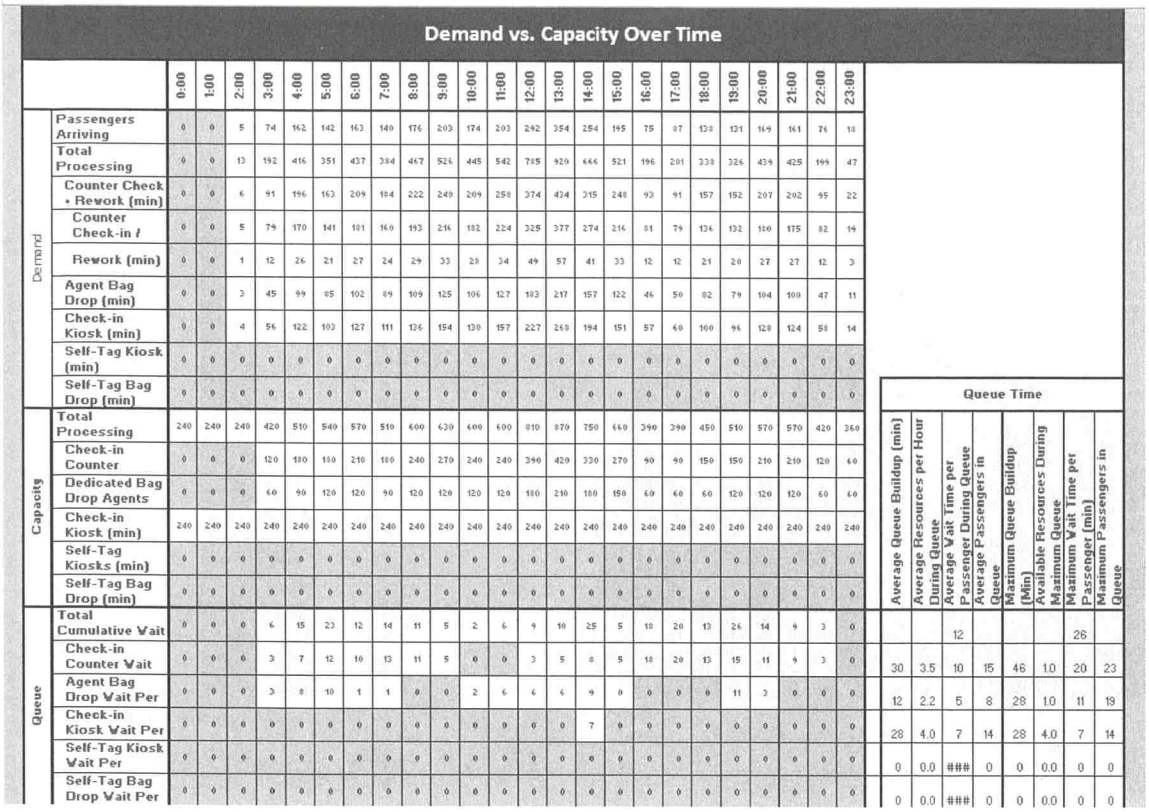
Space Profile Input (Figure 23)

1. Enter the current quantity and space breakdown information for each resource.

At this point the data entry by the user is finished. As mentioned earlier, the following two models are automatically generated by the Simulation Tool based on the input by the user.

SPACE PROFILE			
	Current Quantity	Current Space	Required Space Per
Check-In Counter Positions	20	2000	100
Check-In Counter Queuing	N/A	1000	18
Check-In Kiosks	4	24	6
Check-In Kiosk Queuing	N/A	100	16
Agent-Assisted Bag Drop Positions	4	300	100
Agent-Assisted Bag Drop Queuing	N/A	100	18
Self-Tag Kiosks	0	0	6
Self-Tag Kiosk Queuing	N/A	0	16
Self-Tag Bag Drop Positions	0	0	75
Self-Tag Bag Drop Queuing	N/A	0	18
Non-Processing Area	N/A	3000	3000

Figure 23. Space Profile Input.



Demand vs. Capacity Over Time

		0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Demand	Passengers Arriving	0	0	5	74	162	142	163	140	176	203	174	203	242	354	254	195	75	87	128	121	169	161	74	18
	Total Processing	0	0	13	192	416	351	437	384	467	526	445	542	765	920	666	521	196	201	338	326	434	425	199	47
	Counter Check + Rework (min)	0	0	6	91	196	163	209	184	222	249	209	258	374	434	315	248	93	91	157	152	207	202	95	22
	Counter Check-in /	0	0	5	79	170	141	181	160	193	216	182	224	325	377	274	216	81	79	136	132	180	175	82	19
	Rework (min)	0	0	1	12	26	21	27	24	29	33	28	34	49	57	41	33	12	12	21	20	27	27	12	3
	Agent Bag Drop (min)	0	0	3	45	99	85	102	89	109	125	106	127	183	217	157	122	46	50	82	79	104	100	47	11
	Check-in Kiosk (min)	0	0	4	56	122	103	127	111	136	154	130	157	227	269	194	151	57	60	100	96	128	124	58	14
	Self-Tag Kiosk (min)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Self-Tag Bag Drop (min)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capacity	Total Processing	240	240	240	420	510	540	570	510	600	630	600	600	810	870	750	660	390	390	450	510	570	570	420	360
	Check-in Counter	0	0	0	120	180	180	210	180	240	270	240	240	390	420	330	270	90	90	150	150	210	210	120	60
	Dedicated Bag Drop Agents	0	0	0	60	90	120	120	90	120	120	120	120	180	240	180	150	60	60	60	120	120	120	60	60
	Check-in Kiosk (min)	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
	Self-Tag Kiosks (min)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Self-Tag Bag Drop (min)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Queue	Total Cumulative Wait	0	0	0	6	15	23	12	14	11	5	2	6	9	10	25	5	10	20	13	26	14	9	3	0
	Check-in Counter Wait	0	0	0	3	7	12	10	13	11	5	0	0	3	5	8	5	10	20	13	15	11	9	3	0
	Agent Bag Drop Wait Per	0	0	0	3	8	10	1	1	0	0	2	6	6	6	9	0	0	0	0	11	3	0	0	0
	Check-in Kiosk Wait Per	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0
	Self-Tag Kiosk Wait Per	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Self-Tag Bag Drop Wait Per	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Queue Time

Average Queue Buildup (min)	Average Resources per Hour During Queue	Average Wait Time per Passenger During Queue	Average Passengers in Queue	Maximum Queue Buildup (Min)	Available Resources During Maximum Queue	Maximum Wait Time per Passenger (min)	Maximum Passengers in Queue
		12				26	
30	3.5	10	15	46	1.0	20	23
12	2.2	5	8	28	1.0	11	19
28	4.0	7	14	28	4.0	7	14
0	0.0	###	0	0	0.0	0	0
0	0.0	###	0	0	0.0	0	0

Figure 24. Demand vs. Capacity Over Time summary table.

Queue Model

The Queue Model illustrates the demand versus the capacity for passenger processing at each of the check-in mediums, in terms of minutes and based on the values entered in the profile input sheets. The cumulative queue times are based on the difference between the resource capacity and processing demand as they accumulate and are resolved over time. A summary table, as shown in Figure 24, is used to identify the average queue buildup, average resources per hour during the queue, average wait time per passenger during the queue, average number of passengers in queue, maximum queue buildup, available resources during maximum queue, maximum wait time per passenger, and maximum number of passengers in queue. Charts, as shown in Figures 25 through 30, are included to provide a graphical depiction of the data. The queue model is preformatted for printing.

Space Model

The Space Model, as shown in Figure 31, illustrates the current space allocation versus the simulated space requirements for each of the passenger processing resources in terms of square feet, based on the values entered in the profile input sheets. A summary table is used to identify the current square footage and the simulated square footage for each resource. As various simulations are tested to achieve the queue results desired, the space model will update to illustrate the space required to provide the necessary resources. Charts are included to provide a graphical depiction of the data. The space model is preformatted for printing.

Simulations

After the current models have been developed, the user is prepared to run simulations to see the impact that adding self-tagging resources will have on the airport. Perform the following

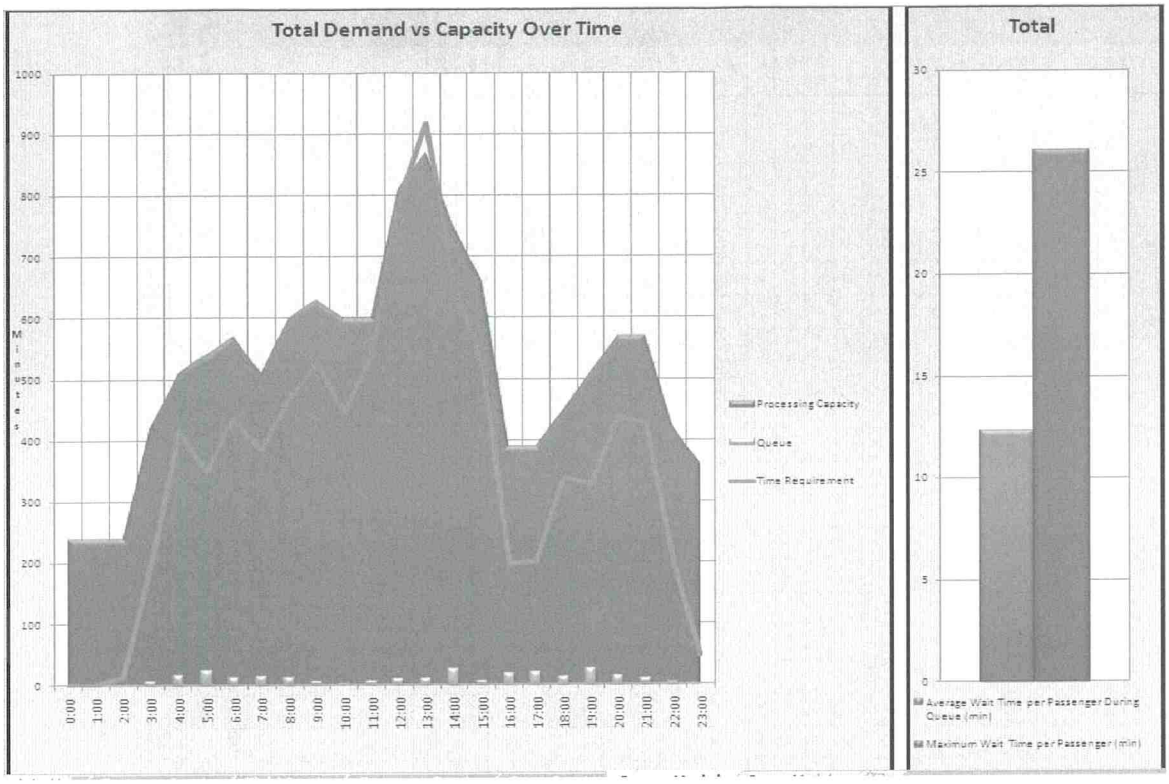


Figure 25. Total Demand vs. Capacity Over Time.

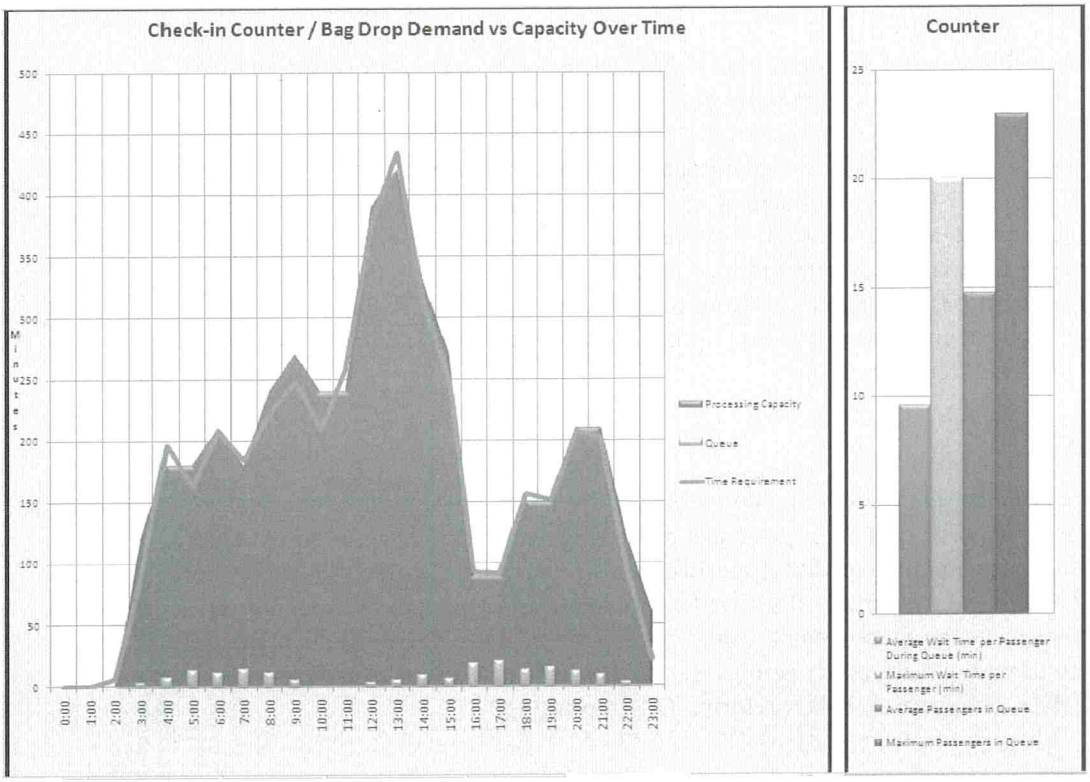


Figure 26. Check-In Counter/Bag Drop Demand vs. Capacity Over Time.

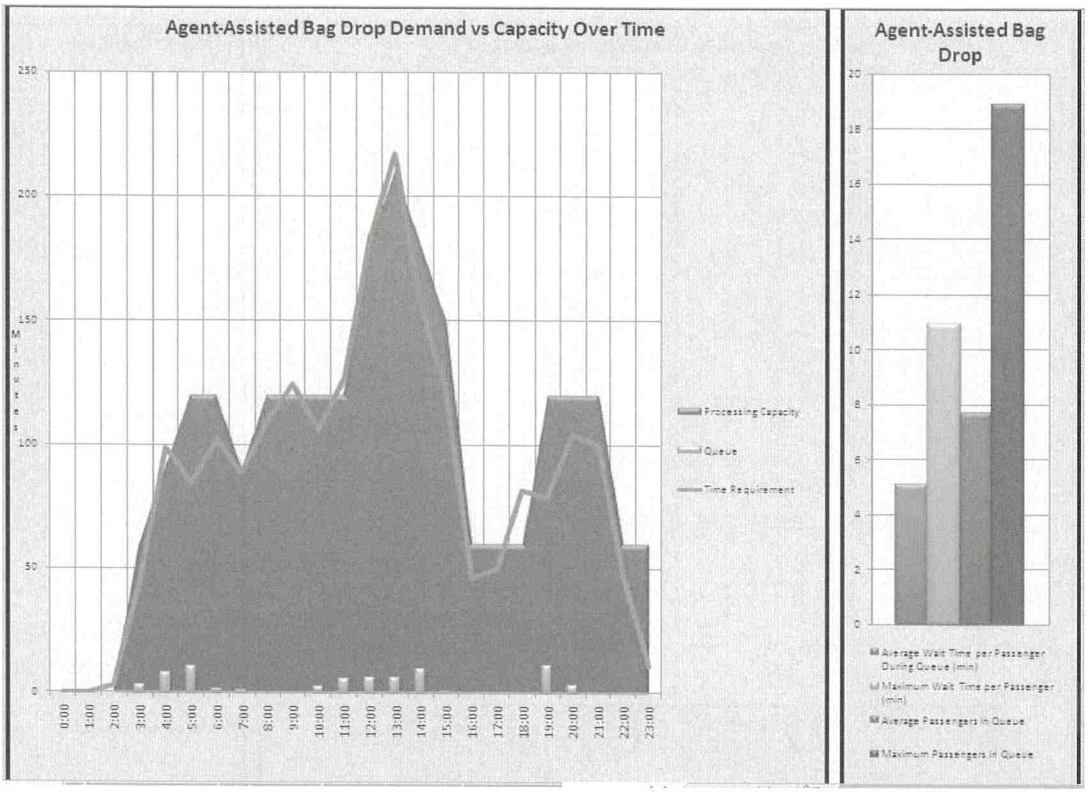


Figure 27. Agent-Assisted Bag Drop Demand vs. Capacity Over Time.

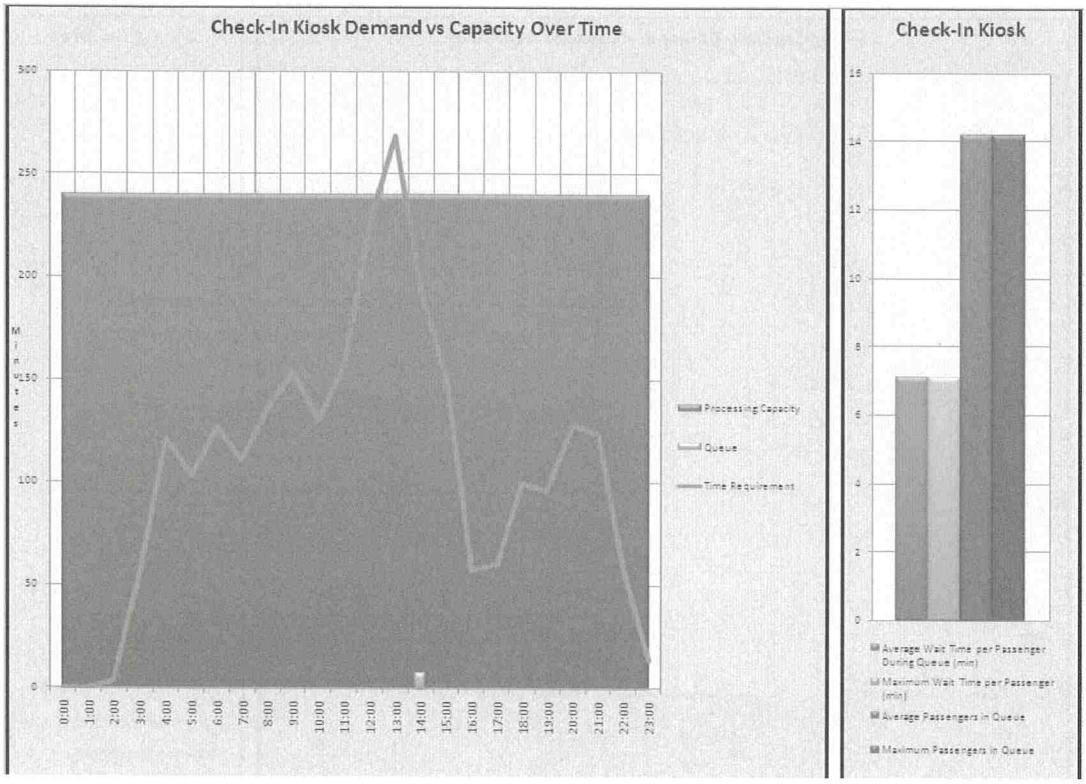


Figure 28. Check-In Kiosk Demand vs. Capacity Over Time.

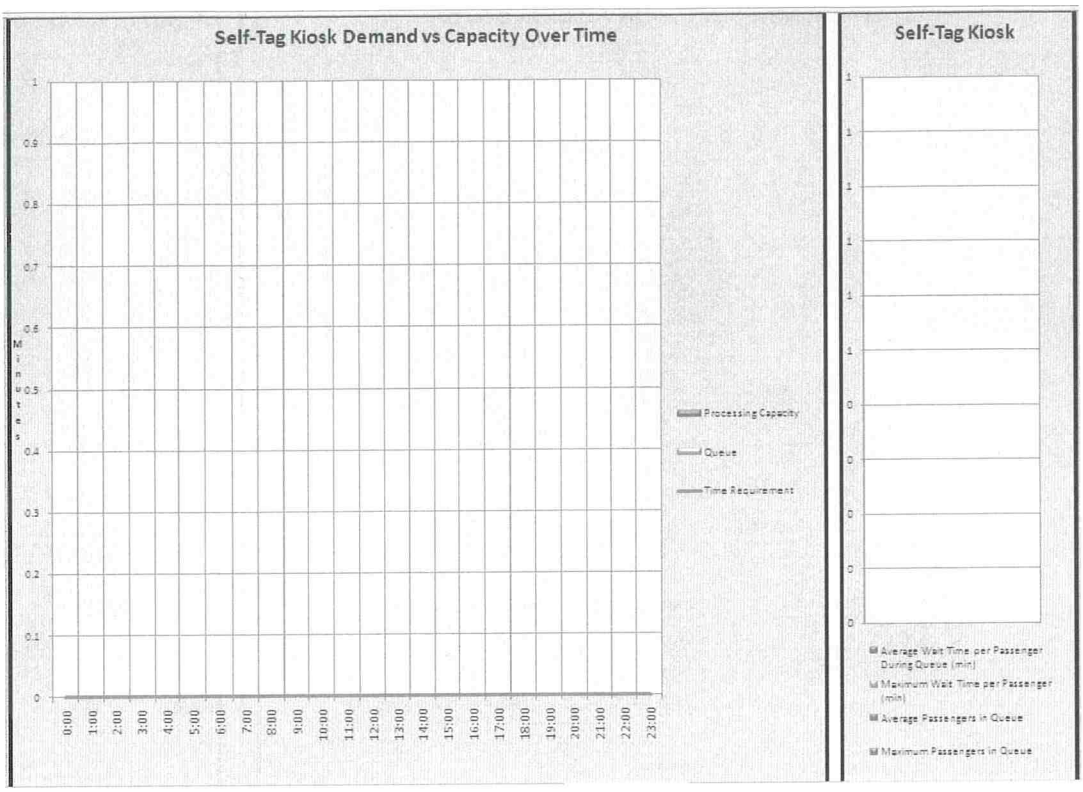


Figure 29. Self-Tag Kiosk Demand vs. Capacity Over Time.

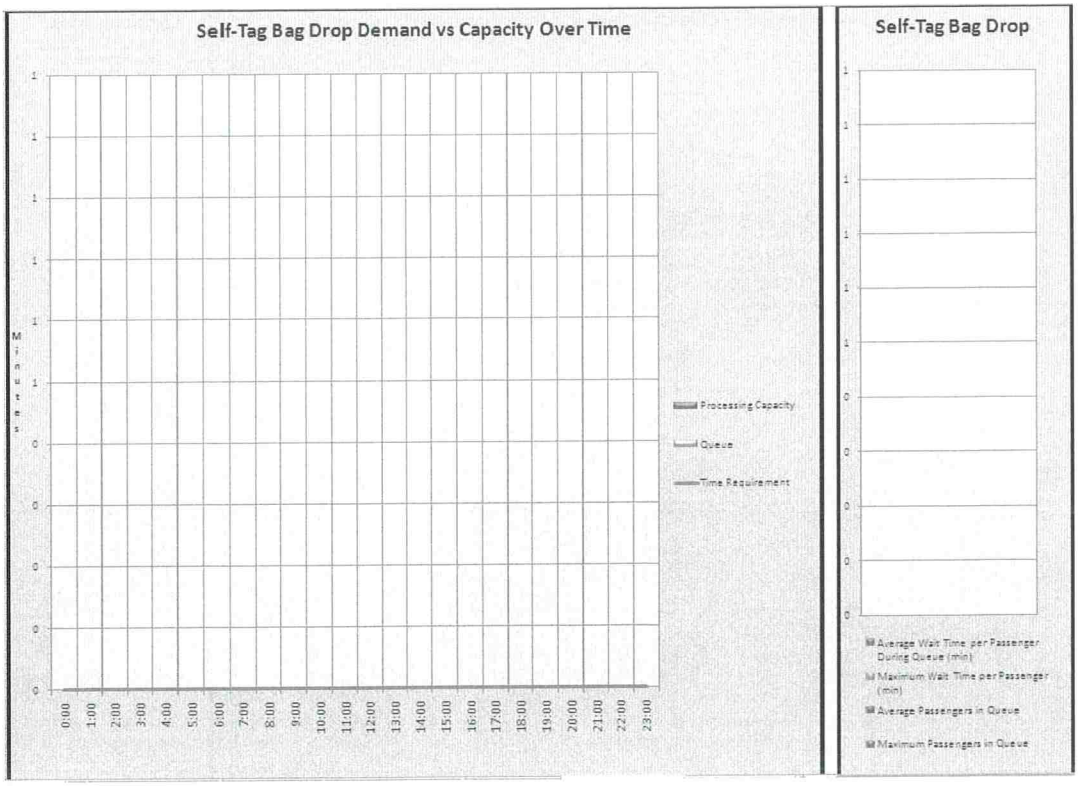


Figure 30. Self-Tag Bag Drop Demand vs. Capacity Over Time.

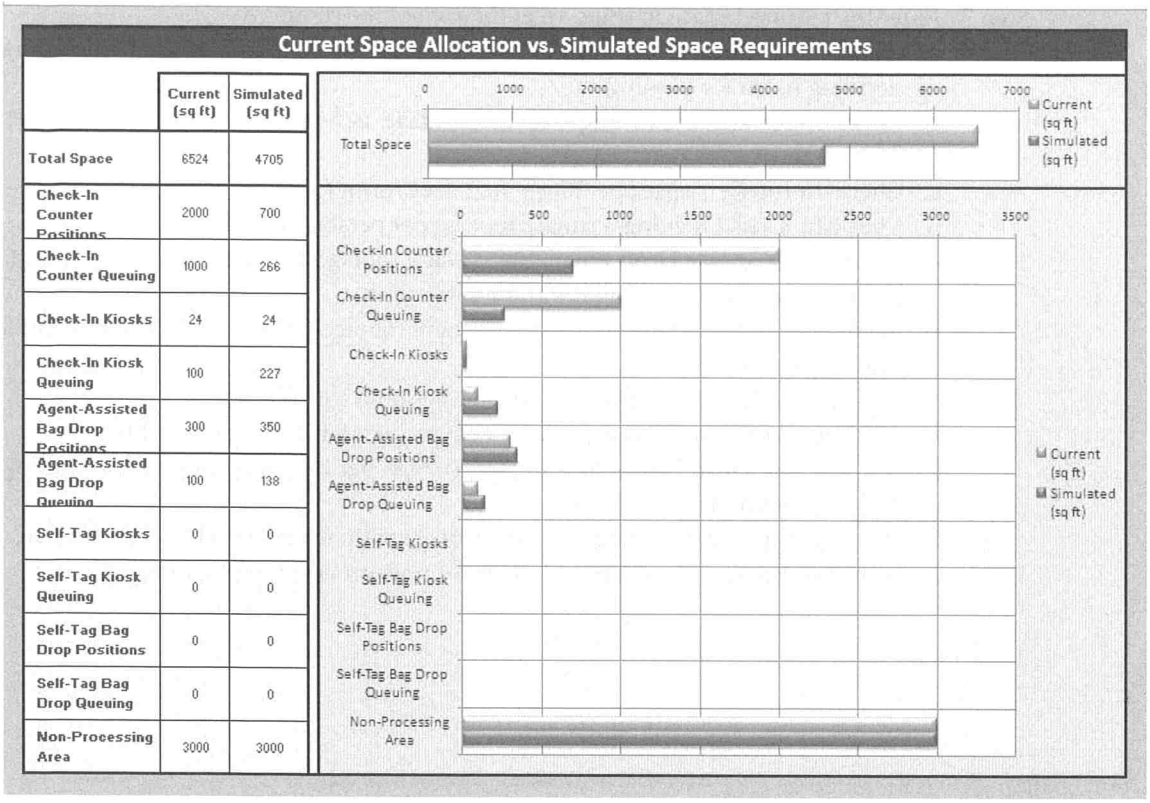


Figure 31. Space Model: Current Space Allocation vs. Simulated Space Requirements.

steps individually to see the impact they have on the current model. Once an understanding has been established as to the impact of individual changes, develop different simulations by combining various changes as desired.

Step 1. Modify throughput times as desired to see the effect they have on queue times and space requirements.

Step 2. Enter values for agent staffing of the Self-Tag Bag Drop and the Self-Tag Kiosks based on estimates of need.

Step 3. Modify all resources as desired to see the effect they have on queue times and space requirements.

Step 4. Add additional flights with generic data to see the effect that growth will have on queue times and space requirements.

Step 5. Modify the Check-In Medium data to include self-tagging.
   a. Add a small percentage of Self-Tag Kiosk users.
   b. Reduce the "Traditional Check-In Counter" and "Self-Service Check-In Kiosk with Bags" accordingly to maintain a total of 100% across all resources.
   c. Observe the effect that migration to self-tagging will have on queue times and space requirements.

Step 6. Modify other passenger profile information to simulate different trends.
   a. Modify load factors to simulate general increases or decreases in air travel.
   b. Modify percentage breakdowns of party sizes to simulate seasons of either greater business travel or leisure travel.
   c. Modify percentage breakdowns of arrival times to simulate passengers trending toward arriving later as they recognize processing times dropping.
   d. Modify rework percentages to simulate an increase in rework requirements upon initial implementation of self-tagging and a decrease in rework requirements as passengers learn the process.

Step 7. Enter the required space in square feet for each of the resources.

a. Check-In Counter Positions—square footage per check-in position including standing room for passengers.
b. Check-In Counter Queuing—square footage per person in check-in counter queue line.
c. Check-In Kiosks—space per kiosk including room for passengers.
d. Check-In Kiosk Queuing—square footage per person in kiosk queue line.
e. Agent-Assisted Bag Drop Positions—square footage per agent assisted bag drop position including standing room for passengers.
f. Agent-Assisted Bag Drop Queuing—square footage per person in agent assisted bag drop queue line.
g. Self-Tag Kiosks—space per kiosk including room for passengers.
h. Self-Tag Kiosk Queuing—square footage per person in kiosk queue line.
i. Self-Tag Bag Drop Positions—square footage per bag drop position, including standing room for passengers.
j. Self-Tag Bag Drop Queuing—square footage per person in bag drop queue line.
k. Non-Processing Area—square footage for non-processing functions.

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*The Transportation Research Board, the National Research Council, and the Federal Aviation Administration (sponsor of the Airport Cooperative Research Program) do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the clarity and completeness of the project reporting.

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Acronyms and Initialisms

AA	American Airlines
AAAE	American Association of Airport Executives
AC	Air Canada
ACC	Airport Consultants Council
ACI-NA	Airports Council International-North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
ADM	Aéroports de Montréal
AF	Air France
AIDX	Aviation Information data Exchange
AKL	Auckland Airport
AMS	Amsterdam Airport Schiphol
ANZ	Air New Zealand
ARN	Stockholm-Arlanda Airport
ATA	Air Transport Association
BCBP	Bar-Coded Boarding Passes
BDO	Behavioral Detection Officer
BHS	Baggage Handling System
BPM	Baggage Process Message
BRS	Baggage Reconciliation System
BSM	Baggage System Message
BRTG	Bags-Ready-To-Go
BTAS	baggage tag activation system
BWG	baggage working group
CAA	Civil Aviation Authority
CBP	Customs and Border Patrol
CHC	Christchurch Airport
CU	Common Use
CUBD	Common Use Baggage Drop
CUPPS	Common Use Passenger Processing System
CUSS	Common Use Self-Service
CUTE	Common Use Terminal Equipment
DCS	Departure Control System

DfT	Department for Transport
DSM	Des Moines Airport
DUB	Dublin Airport
EI	Aer Lingus
EZY	EasyJet
FSD	Federal Security Director
FTE	Full-time Employee
IATA	International Air Transport Association
ICE	Immigration and Customs Enforcement
IT	Information Technology
ITIL	Information Technology Infrastructure Library
GPP	General Purpose Printer
GVA	Geneva International Airport
MACs	Moves, Adds, Changes
MAF	Ministry of Agriculture and Fisheries
NASP	National Aviation Security Program
PCI DSS	Payment Card Industry Data Security Standard
PPBM	Positive Passenger Bag Match
PEMG	Passenger Experience Management Group
PSG	Process Subgroup
PSI	Principal Security Inspector
PST	Passenger Self-Tagging
RFID	Radio Frequency Identification
SBT	Self Baggage Tag
SEA	Seattle-Tacoma International Airport
StB	Simplifying the Business
TC	Transport Canada
TRB	Transportation Research Board
TSA	Transportation Security Administration
WLG	Wellington International Airport
WS	WestJet
YUL	Montréal Pierre Elliott Trudeau International Airport
YVR	Vancouver International Airport
YYZ	Toronto Pearson International Airport

APPENDIX A

Research Documentation

Appendix A is not published herein, but is available online as Web-Only Document 10 at http://www.trb.org/Main/Blurbs/164162.aspx.

APPENDIX B

Simulation Tool—Industry-Based Data Values

Table B-1. Sample simulation tool values—processor throughput.

PROCESSOR THROUGHPUT				
	Party of 1 (seconds)	Party of 2 (seconds)	Party of 3 (seconds)	Party of 4 (seconds)
Check-in Counter	120	240	360	480
Check-in Kiosk	120	180	240	300
Agent Assisted Bag Drop	90	120	150	180
Self-Tag Kiosk	150	210	270	330
Self-Tag Application	20	30	40	50
Self Bag Drop	45	90	135	180
Rework	120	240	360	480

Table B-2. Sample simulation tool values—passenger profile.

PASSENGER PROFILE														
Party Size (100%)				Arrival Time (must total 100%)			Check-In Medium (must total 100%)							Rework
1	2	3	4	Early Segment	Midrange Segment	Late Segment	Counter	Web / Mobile - No Bags	Web / Mobile - Bags	Check-In Kiosk - No Bags	Check-In Kiosk - Bags	Self-Tag Kiosk		
60%	25%	10%	5%	30%	60%	10%	33%	19%	19%	14%	15%	0%		5%

Table B-3. Sample simulation tool values—space profile.

SPACE PROFILE	
	Required Space Per (square feet)
Check-in Counter Positions	100
Check-in Counter Queuing	18
Check-in Kiosks	6
Check-in Kiosk Queuing	16
Agent Assisted Bag Drop Positions	100
Agent Assisted Bag Drop Queuing	18
Self-Tag Kiosks	6
Self-Tag Kiosk Queuing	16
Self-Tag Bag Drop Positions	75
Self-Tag Bag Drop Queuing	18

APPENDIX C

Assessment Tool Content Information

Table C-1. Commercial assessment.

Questions for Validation	Basis	Impact	Resulting Action	Cost Impacts
Is a common use system installed at the airport?	An airport-owned and operated self-tagging implementation is based on a common use platform.	Without a current common use platform in place, an airport must undergo additional cost and effort associated with the implementation of common use self-service (CUSS) kiosks, including gaining the support and cooperation of the airlines. The impact may also include common bag drop.	The airport must develop a common use strategy as an underlying passenger processing methodology.	1. Airport staff and consultant manhours for planning and design 2. Transition costs from airline-dedicated kiosks to airport-owned CUSS kiosks 3. Infrastructure costs for common baggage handling system
Are current airlines amenable to passenger self-tagging?	The implementation of self-tagging directly impacts the business models and operational processes of the airlines.	Without support and cooperation from the airlines, a self-tagging initiative is unlikely to succeed.	The airport should seek to understand the concerns that the airlines have with self-tagging and seek to resolve them cooperatively.	1. Airport staff and consultant manhours for planning and coordination
Is there an airline-centric working group to support the self-tagging decision-making process?	A passenger self-tagging working group that represents the airlines is an effective way to uncover and accommodate airline concerns and requirements.	Without a working group, the airport will spend an excessive amount of time trying to uncover individual airline requirements and may end up with conflicting information.	The airport should facilitate the development of a working group comprised of representation from each airline to provide input into the self-tagging decision-making process.	1. Airport staff and consultant manhours for planning and ongoing meeting coordination
Are current lease agreements expiring in the near term?	Airport-owned self-tagging requires lease agreements with provisions similar to common use, enabling the airport to implement a self-tagging solution.	Lease agreements not written to accommodate common use provisions limit the airport's ability to implement a self tagging solution.	If the leases are expiring, the airport should work with the airlines to put language in the lease that will give the airport the rights it needs to implement a self-tagging solution. If the leases are not expiring in the near term, the airport needs to seek amendment options to long-term leases.	1. Airport management and business staff and consultant manhours for planning and reorganization of lease requirements
Are the airlines' business drivers known?	Supporting the airlines' business drivers are critical to the success of a self-tagging implementation.	If the airport moves forward with self-tagging without an understanding of the airlines' business drivers, they will likely have significant pushback from the airlines, which may result in an unsuccessful initiative.	The airport should seek to understand the airline(s) business drivers that may be affected by self-tagging, so as to develop a design to best accommodate each.	1. Airport management and business staff and consultant manhours for planning and business definition 2. Airport staff and consultant manhours for design work

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Table C-1. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impacts
Are the airlines' customer service goals with respect to queuing times in the check-in lobby known?	Queue times serve as a baseline measurement that enables resource planning for self-tagging.	Without an understanding of the queue time goals, the ability to plan adequately for resources will be limited and the resulting implementation may not meet the passenger processing demand.	The airport should work with each airline to uncover its queue time goals for each passenger processing function, and use that information in conducting self-tagging simulations.	1. Airport staff and consultant manhours for planning, potential time-motion studies, and self-tagging simulations 2. Potential software costs for simulation tools
Are the airlines' business practices for handling priority passengers and exceptions known?	Supporting the airlines' business practices are critical to the success of a self-tagging implementation.	If the self-tagging implementation is not based on an understanding of the airlines' practices for processing priority passengers and exceptions, an excessive number of failures requiring rework may occur.	The airport should work with each airline to understand its specific handling processes for priority passengers and exceptions, and design a solution that accommodates each.	1. Airport management and business staff and consultant manhours for planning and business definition 2. Airport staff and consultant manhours for design work
Are the airlines' current and projected passenger demographics known?	Passenger demographics are an important informational input for resource planning for self-tagging.	Without an understanding of the passenger demographics, the ability to plan adequately for resources will be limited and the resulting implementation may not meet the passenger processing demand.	The airport should work with each airline to understand its specific passengers' demographic makeup, and use that information in conducting self-tagging simulations.	1. Airport staff and consultant manhours for planning, potential time-motion studies, and self-tagging simulations 2. Potential software costs for simulation tools
Are airline baggage payment and exception requirements known?	Airline baggage exception rules, such as overweight fees are always subject to change. Payment options for baggage vary greatly, based on specific airlines and locations. Payment for baggage may occur at the self-service kiosk or at the common bag drop location. Each variation must be accommodated in an airport-owned self-tagging implementation.	Not accounting for the baggage exception rules can severely impact the airlines ability to operate.	The airport should work with each airline to understand its specific baggage exception rules, and use that information in the design of the self-tagging solution.	1. Airport finance and operations staff, and consultant manhours for planning, and design 2. Potential software, costs to implement payment scenarios

Table C-1. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impacts
Are customer service requirements understood?	An airport-owned self-tagging implementation, where more than one airline is involved, results in the potential mixing of airline passengers at the same check-in locations, at the same time.	Airlines struggle with how to properly service customers, where there is a mix of airline passengers. This can result in the potential mishandling of customers, and ultimately affect the "customer service" image of an airport.	The airport should work with the airlines involved to establish a customer service plan to ensure proper customer service is applied.	1. Airport staff and consultant manhours for planning and development of a plan 2. Potential airport staff in the execution of the customer service plan
Are rules established for the use of common use kiosks in dedicated airline lease spaces?	CUSS kiosks by definition are used by multiple airlines. Some airlines block the usage of the CUSS kiosks from other airlines' passengers.	If there is not an established set of rules, then each airline may treat these differently.	The airport should work with the airlines involved to establish a kiosk usage plan.	1. Airport staff and consultant manhours for planning and development of a plan

Table C-2. Legal/financial risk assessment.

Questions for Validation	Basis	Impact	Resulting Action	Cost Impacts
Are there contractual requirements for airline employees at ticket counter locations?	Some airlines have union contracts in place that must be considered during the implementation of self-tagging.	The implementation of self-tagging results in the modification of job duties for a portion of the airline agents. Making these modifications in practice may cause a breach in existing contract terms.	The airport should have its legal department assess the potential impact and include the findings in the decision-making process.	1. Airport management and legal staff and consultant manhours for planning and impact assessment
Is the funding for passenger self-tagging adequately understood and budgeted for?	A self-tagging implementation requires investment in consulting, design, construction, equipment, and ongoing maintenance. Many of these costs are associated with necessary changes to existing equipment and infrastructure, such as with self-service kiosks and baggage handling systems.	Unknown costs can severely affect the successful outcome of the self-tagging implementation.	Using this Assessment Tool, the airport can establish a detailed matrix of costs for all areas of a self-tagging implementation. As the U.S. pilots for self-tagging mature, airports will have the opportunity of working through ACI to potentially obtain sample costs from these pilot locations.	1. Airport management and finance staff and consultant manhours for planning and financial impact assessment

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Table C-2. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impacts
Are liability issues resulting from impacting airline operations properly understood?	An airport-owned self-tagging implementation can ultimately result in shared responsibility of the airport and airline in equipment reliability, baggage acceptance, and other operational issues.	If failures in an airport-owned or controlled system cause a negative impact on airline operations, the airport may be at risk for financial damages.	The airport should conduct a risk analysis to assess the potential impact on all process steps of the self-tagging implementation and include the findings in the decision-making process. If necessary, the airport should pursue the introduction of baggage handling service agreements.	1. Airport management and legal staff and consultant manhours for planning and impact assessment, and development of the agreement
Can changes be made to rates and charges to support the implementation of self-tagging?	The costs of implementing and supporting a common-use self-tagging implementation may be recuperated through modification to rates and charges.	If the airport is not able to update the rates and charges to the airlines in a timely manner, the project may not have sufficient funding.	The airport should have its finance department assess the capacity for increasing rates and charges and include the findings in the decision-making process.	1. Airport management and finance staff and consultant manhours for planning and rate and charges plan

Table C-3. Facility impact assessment.

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Will self-tagging be implemented in an existing facility?	Extensive facility modifications to the baggage handling system, check-in areas, and others may be required to accommodate self-tagging.	The use of an existing facility limits the design possibilities of a self-tagging solution.	The airport must thoroughly understand the facility limitations and develop a self-tagging solution that will provide the greatest benefit to passenger flow and check-in efficiency within the physical and resource constraints.	1. Airport staff and consultant manhours for planning and design 2. Potential significant costs in facility and infrastructure changes
Is a significant increase in enplanements expected?	As passenger traffic increases, the requirement for an efficiency-based self-tagging design becomes critical.	If the self-tagging solution is not designed to reduce congestion, increase passenger flow, and reduce processing time, significant rework may be required as passenger traffic increases.	The airport must evaluate the projected growth in volume of passengers and design a self-tagging solution that will draw passengers away from the traditional check-in areas to reduce congestion in the lobby.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in facility and infrastructure changes
Is the check-in lobby area space constrained?	Processing time at a self-tagging kiosk is generally longer than at a self-service kiosk without self-tagging. Also, space requirements around a self-tagging kiosk generally require a greater foot print than with a traditional self-service kiosk.	If self-tagging kiosks are implemented in a space-constrained check-in lobby, congestion problems may actually increase.	The airport must evaluate space requirements for placement of self-tagging kiosks within the check-in lobby area and design a self-tagging solution that will minimize space congestion.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in facility and infrastructure changes

Table C-3. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Is passenger flow congested?	The efficiency of passenger flow can be improved through a strategic self-tagging implementation.	If self-tagging kiosks are implemented without a strategic approach to improving passenger flow, the result may actually impede passenger flow.	The airport must evaluate the current passenger flow and congestion and design a self-tagging solution that will draw passengers away from the traditional check-in areas.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in facility and infrastructure changes
Are baseline measurements for passenger processing available?	Baseline measurements for passenger processing are necessary for developing useful simulations to determine the appropriate self-tagging resource distribution.	Designing a self-tagging solution without accurate baseline measurements will likely result in an implementation that does not meet the desired goals.	The airport should conduct time and motion studies of the current check-in processes to establish a set of throughput baselines.	1. Airport staff and consultant manhours for planning and design, conducting time and motion studies 2. Potential costs in facility and infrastructure changes
Is the security checkpoint area currently a point of congestion that is space constrained?	An improvement in passenger processing throughput as a result of a self-tagging implementation can impact passenger flow patterns at the security checkpoint.	As passenger throughput increases, queue line congestion/peaks at the security checkpoint may increase.	The airport should work with the local TSA during concept design to study and monitor changes in passenger flow at the security check point, to ensure the TSA is prepared for potential passenger flow changes at the security checkpoint.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in facility and infrastructure changes 3. May also include staffing costs at the security checkpoint
Is a centralized baggage handling system with baggage sortation available where self-tagging and common bag drop are being considered?	A common bag drop system requires a means to sort and screen (tag status, etc.) baggage from any participating airline inducted at the baggage drop position(s).	Without a centralized baggage handling system, and the means to effectively screen baggage, a self-tagging solution will be costly and limited.	The airport should assess the baggage handling system requirements for the desired self-tagging implementation during the conceptual design phase to understand the limitations and potential modifications to the baggage handling systems.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in changes to the baggage handling system, including infrastructure, and screening equipment and software.
Is the baggage makeup area space constrained?	The physical space in the baggage makeup area must be able to accommodate any additional equipment that may be required for a self-tagging implementation, including injection belts, inline scales, bag-tag scanners, and baggage diverters.	A lack of space in the baggage makeup area may limit the airport's ability to make the necessary changes to the baggage handling system, to accommodate the self-tagging implementation.	The airport should evaluate modifications needed to the baggage handling system during the conceptual design phase, to ensure the design is in accordance with the space limitations of the baggage makeup area.	1. Airport staff and consultant manhours for planning and design 2. Potential costs include facility, hardware, and software changes to the baggage makeup area.
Does the baggage handling system have the capacity to accommodate demand at peak operations?	The implementation of self-tagging will likely increase the peak demand on the baggage handling system.	Due to the potential increase in peak demand, the capacity of the baggage handling system may need to be increased as part of the self-tagging implementation.	The airport must assess the throughput capacity of the baggage handling system compared with peak-operations under the planned self-tagging model and plan to make modifications if required.	1. Airport staff and consultant manhours for planning and throughput simulations 2. Potential costs in baggage handling system modifications.

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Table C-3. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Can the baggage handling system accommodate additional induction points?	To achieve passenger processing efficiencies, along with accommodations for airline locations, more than one baggage induction/acceptance point may be needed.	Depending on the physical layout, more than one baggage induction point may not be possible, or may result in significant costs.	The airport must assess the accessibility to the baggage handling system for the location in which the self-tagging bag drop is designed. If additional induction belts are required, these should be included in the design.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in baggage system modifications.

Table C-4. Operational assessment.

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Are performance criteria, such as time and motion studies, for current check-in processes available?	To make an informed decision as to the benefit of a self-tagging installation, time and motion information of current check-in processes (desk check-in, self-service kiosks, bag drop) is necessary.	Designing a self-tagging solution without accurate time and motion information will likely result in an implementation that does not meet the desired goals.	The airport should work with the partnering airlines to obtain/conduct time and motion studies for use in process modeling and layout in the self-tagging and bag drop implementation	1. Airport staff and consultant manhours for planning and design, conducting time and motion studies 2. Potential costs in facility and infrastructure changes
Are check-in kiosks (airline-dedicated or common use self service) currently in use for the areas or airlines where self-tagging is under consideration?	A self-tagging solution requires the use of self-service kiosks for check-in.	The placement of self-service kiosks is a significant planning component of passenger self-tagging.	The airport should account for the costs of self-service kiosks. The airport should involve the airlines with the planning phases of the kiosk design and placement.	1. Airport staff and consultant manhours for planning and design 2. Potential costs in hardware and software costs for kiosks.
Can current self service check-in kiosks accommodate printers for bag tags?	Self-tagging requires the printing of bag tags at the self-service kiosk.	Without bag-tag printers, self-tagging is not possible.	The airport should determine if the existing kiosks can be retrofitted or if new kiosks must be procured.	1. Airport staff and consultant manhours for planning 2. Potential costs in printers, paper stock, kiosks and/or kiosk upgrades.
Can rebooking be moved to a location away from the ticket counters, to gate lounges or other locations?	Rebooking operations require the use of staff and facilities in a manner different from the standard check-in process.	If not planned for properly, or removed from the check-in area, rebooking operations can result in long queue lines and disruption of the self-tagging process.	The airport should work closely with its airline partners in reviewing all rebooking options, and establish a plan that best accommodates the entire check-in process.	1. Airport staff and consultant manhours for planning and preparation of a rebooking plan 2. Potential costs in facility and infrastructure changes

Table C-4. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Are airport responsibilities for passenger rights regarding checked bags understood?	If the airport is going to take over a portion of the rules of carriage, then the airport may need to comply with passenger rights regarding checked bags.	Not being able to comply with these rights will limit the ability of the airport to pursue self-tagging and bag drop.	The airport should work with risk management and legal departments to resolve any issues that are identified.	1. Airport legal and management staff and consultant manhours for assessing risk and developing a plan
Does airport IT currently support operational systems for the airport?	Self-tagging and bag drop require new IT systems and support.	Airports not prepared for providing IT support can affect the successful operations of the self-tagging implementation	The airport should analyze and plan for the appropriate level of IT support, internal and/or outsource staffing.	1. Airport staff and consultant manhours for planning and preparation of IT support 2. Potential costs in IT infrastructure upgrades 3. Potential costs in additional airport staff and/or outsourcing contracts 4. Potential cost in training
Are the airline service level requirements in supporting a self-tagging implementation known?	An airport owned and operated self-tagging system requires ongoing maintenance of self-service kiosks and baggage induction / handling systems (depending on the level of implementation).	If maintenance requirements of the airlines cannot be accommodated, the airport is at significant risk for adversely affecting airline operations.	The airport should review the airlines' current support agreements to uncover requirements that will be impacted by self-tagging and make accommodations to provide the necessary level of service.	1. Airport staff and consultant manhours for planning and preparation of IT and maintenance support 2. Potential costs in infrastructure upgrades 3. Potential costs in additional airport staff and/or outsourcing contract 4. Potential cost in training
Is the number of bag tags printed for each passenger accounted for today by the airlines or airport (included unused tags)?	Self-tagging increases the chances of "user error" in the number of bags printed and discarded.	Document control of the bag tag impacts the design of the self-tagging and bag drop implementation.	The airport should analyze and establish accountability policies and procedures for bag-tag printing. Bag-tag status (active or inactive) should be considered in the resultant procedures.	1. Airport staff and consultant manhours for planning and preparation of procedures
Are there adequate airport service management processes and on-site technical support to maintain systems and hardware (kiosks, bag drops, technology infrastructure)?	A self-tagging implementation shared by more than one airline necessitates the shared responsibilities for service and maintenance between airlines and/or airport staffing.	Service levels will not be met if the staffing is not appropriate. Any implementation of this nature would require an analysis of processes and on-site technical support.	The airport should analyze what staff is needed to support a self-tagging/bag drop implementation, and create appropriate management processes to meet the support needs of these systems.	1. Airport staff and consultant manhours for planning and preparation of management processes 2. Potential costs in additional maintenance staff

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Table C-4. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Are airport procedures in place to account for self-tagging during irregular operations?	Service recovery is a key operations issue. When irregular operations occur, the airlines depend on their passenger processing systems to ensure passengers are processed on flights.	Airlines typically resist any airport-provided service that can reduce the ability of the airline to meet operational needs. This is even more critical given new regulations that impact penalties that airlines have to pay for delays.	The airport should create processes which will support service recovery and meet the airlines' needs.	1. Airport staff and consultant manhours for planning and preparation of procedures
Are there plans for off-site check-in?	Off-site check-in can enhance the performance of a self-tagging solution.	Impact may be significant depending on the requirement for printing active or inactive bag tags.	The airport should work with security authorities (TSA, local security staff, etc.) to resolve any open security issues.	1. Airport staff and consultant manhours for planning 2. Potential process or infrastructure changes to existing off-site check-in
Is the current infrastructure to support self-tagging and bag drop (i.e., building, telecom, BHS, etc.) airport-owned?	As with other common use systems, an airport-owned self-tagging and common bag drop system necessitates the ownership of airport infrastructure.	The impact varies due to ownership and implementation decisions. Any time there are two parties involved in the ownership of the system and infrastructure, the impact increases.	The airport must develop a common use strategy, defining infrastructure ownership. It may be necessary for the airport to take ownership of the various infrastructure components, but it depends on the implementation.	1. Airport staff and consultant manhours for planning 2. Transition costs from airline-dedicated to airport-owned infrastructure
Is there a configuration and change management process already established to track the airport's infrastructure configuration changes?	Configuration and change management is key in an IT system to ensure that changes are made in a manner that limits the impact to operational activities.	Not having a configuration and change management process established will adversely impact airline operational activity.	The airport should create a configuration and change management process according to a standard such as IT infrastructure library (ITIL).	1. Airport staff and consultant manhours for planning and preparation of change management procedures 2. Potential training costs
Can the airport support the airlines' current processes for mishandled bags?	A common bag drop solution must be prepared to support the various airline processes for mishandled bags.	Airline operation is affected if the bag drop implementation cannot support airline mishandled bag rules.	The airport should work with the airlines to ensure airline rules for mishandled bags are supported in the self-tagging system and the designs account for dynamic changes of these rules.	1. Airport staff and consultant manhours for planning and preparation of procedures
Can the airport support the Americans with Disabilities Act (ADA) requirements for special needs travelers in the self-tagging and bag drop implementation?	Accessibility guidelines, as given by ADA must be considered when undertaking any project that impacts passenger processing in the U.S.	If the processes are unable to support ADA requirements, the overall implementation of self-tagging and bag drop could be adversely impacted.	The airport should identify all ADA requirements and work with the local ADA community to determine a resolution.	1. Airport staff and consultant manhours for planning and preparation of procedures

Table C-4. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Can location signage for self-tagging and bag drop be clear and prominent, as well as conforming to the airports signage requirements?	Signage is required both to provide branding for the airlines and/or services provided, as well as to provide way finding and instruction.	Poor signage or conflicts with the airport signage program can cause confusion with the passengers and may also cause concerns with the airlines.	The airport should work with the airlines to determine their needs for signage and ensure that these needs can fit within the airport signage program.	1. Airport staff and consultant manhours for planning, and design 2. Potential software, hardware, and infrastructure costs for dynamic signage components
Can the airport support presenting airlines in particular kiosk locations (i.e., are all airlines active on all kiosks, or are some blocked in particular locations) in the self-tagging implementation?	Each airline may have varying requirements impacting the use and placement of kiosks throughout the facility (such as with location and presentation of airline brands), and may wish to restrict how their application is installed in the airport.	Not understanding specific airline business rules for use on self-service kiosks can impact the success of airport-controlled self-tagging kiosks.	The airport should work with the airlines to establish rollout plans to ensure the greatest success in kiosk usage.	1. Airport staff and consultant manhours for planning, and design 2. Potential software, hardware, and software costs for kiosks
Do bags need to be weighed in a specific area to accommodate all airline baggage acceptance and exception requirements?	Airlines may require weight to be measured on bags within a certain proximity of their check-in desks.	Locations of weigh stations could determine the locations of the self-tagging and bag drop systems.	The airport should work with the airlines to determine their weighing requirements.	1. Airport staff and consultant manhours for planning, and design 2. Potential hardware and infrastructure costs for bag scales
Are airline employees required to activate the bag tag in the BRS and conduct a document check?	If the self-tagging implementation uses active/inactive tags, there may be requirements (labor, other) that would allow only airline employees the ability to activate the bag tag.	Tag activation may need to incorporate airline employees, which can impact the operations of an airport-controlled bag drop location.	The airport should work with airlines to determine the impact of this requirement, and to help establish an airport plan.	1. Airport staff and consultant manhours for planning, and design
Are locations needed for passengers to weigh and possibly repack their bags prior to approaching the bag drop?	Airlines may wish to have a separate counter for rework to allow passengers the ability to weigh their bags and then repack if necessary.	Additional space may need to be allocated to support this activity.	The airport should work with airlines to determine the impact of this requirement, and to help establish an airport plan.	1. Airport staff and consultant manhours for planning, and design 2. Potential facility changes
Does the airline have requirements for specialized passenger areas (i.e., business class, rework)?	Airlines may wish to have separate areas to treat their premium passengers differently than the other passengers.	Additional space may need to be allocated to support this activity.	The airport should work with airlines to determine the impact of this requirement, and to help establish an airport plan.	1. Airport staff and consultant manhours for planning, and design 2. Potential facility changes

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Table C-4. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Do the kiosks need to filter out passengers with exception processing requirements?	Some airlines would like to have the self-tagging kiosk operations "kick out" any exceptions to a special airline handling area to keep the bag drop moving efficiently.	Additional kiosk logic and/or locations may need to be identified. Depending on the airport layout, exception handling locations may have impact on airline locations with relation to the distance a passenger may have to walk from the kiosk or bag drop location.	The airport should work with the airlines to establish rules for handling exceptions.	1. Airport staff and consultant manhours for planning, and design
Does the self-tagging application provide a receipt for baggage?	Passengers will require a receipt for their baggage when they self-tag. This receipt may be used to find their baggage, verify that they are the owner, and other requirements, based on airline-specific rules.	Receipt printers may be required, or the boarding pass printer will also need to produce receipts for baggage.	The airport should work with airlines to determine the impact of this requirement.	1. Airport staff and consultant manhours for planning, and design 2. Potential hardware and software changes to kiosks 3. Potential printer and paper stock costs
Is there a formal process for kiosk moves, adds, changes (MACs)?	Along with service level agreements, and change and maintenance management, the airport needs a defined process for MACs.	If there is no formal process defined, changes could adversely impact airline operations.	The airport should work with airlines to determine the impact of this requirement, and to prepare the plan.	1. Airport staff and consultant manhours for planning, and preparation of the plan
Are criteria established to accurately measure and monitor queues?	Queues are a critical impact to the overall success of a self-tagging project.	If there are no criteria established, it will be difficult to determine how the self-tagging system is functioning and when to add additional resources to reduce queues.	The airport should work with airlines to establish appropriate monitoring plans.	1. Airport staff and consultant manhours for planning, and preparation of the plan 2. Potential costs for airport staff towards the execution of the plan
Do airlines offer a self-service irregular operations recovery process?	Airlines are improving their self-service offerings and allowing passengers the ability to perform more tasks in a self-service mode.	If the airlines wish to provide these services, then the self-service kiosks will need to be configured to allow irregular operations recovery processes. This may include additional locations and more support staff.	The airport should work with airlines to establish appropriate plans.	1. Airport staff and consultant manhours for planning, and preparation of the plan 2. Potential costs for airport staff towards the execution of the plan
Is the airport interested in a home printing tag solution?	One method of self-tagging which is evolving includes printing tags at home on the passenger's personal printer.	This emerging process will require a change in the airline system to support printing bag tags at home.	The airport should work with airlines to identify requirements.	1. Airport staff and consultant manhours for long-term planning
Is the airport pursuing or already have an RFID solution as part of its baggage system?	Some airports are using RFID bag tags.	This process may require special self-tagging bag tags, which may impact the current self-service kiosk configuration.	The airport should work with airlines to identify requirements and research available RFID bag tags and their ability to function within the self-tagging kiosks.	1. Airport staff and consultant manhours for planning 2. Potential hardware and software costs to modify the kiosks 3. Special paper stock
Can non-active or non-tagged bags be placed on baggage belts?	Airlines, airports, and government regulators are very concerned that a non-tagged, or non-active-tagged bag can be introduced into the baggage system and ultimately make it onto an airplane.	Allowing non-tagged or inactive-tagged bags into the baggage system would not meet the intent of the self-tagging, bag drop system.	The airport should ensure that the system is designed to prevent non-active or non-tagged bags from being placed on the bag belt.	1. Airport staff and consultant manhours for planning, and design 2. Potential hardware and software costs for scanners

Table C-4. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Can passengers place bags incorrectly onto bag belts?	Different types of bags (e.g., wheeled, soft-sided) must be placed on the take-away belt in different ways, including the use of baskets.	Incorrectly placing baggage on the baggage belt could cause baggage system jams downstream.	The airport should work with airlines to establish appropriate plans and procedures.	1. Airport staff and consultant manhours for planning, and preparation of the plan 2. Potential costs for airport staff towards the execution of the plan
Will operations need to continue in a manual mode if the system goes down?	System outages are especially an issue in a small airport. In a large airport, there may be enough stations to ensure that there is a subset of the system working.	If there is no manual process, all passenger processing could stop if the entire system is down.	The airport should work with the airlines to define a manual	1. Airport staff and consultant manhours for planning, and preparation of the plan 2. Potential costs for airport staff towards the execution of the plan
Will the airline change their acceptance rules to allow printing of tags earlier?	If all kiosks are able to print bag tags, it is possible that passengers may want to drop their bags earlier.	Early bag drop requires larger amounts of hold space in the back for baggage.	The airport should work with airlines to establish appropriate plans and procedures.	1. Airport staff and consultant manhours for planning, and preparation of the plan 2. Potential costs for airport staff towards the execution of the plan
Is the airline producing a proper BSM (per IATA standards) for the BRS?	Self-tagging relies on accurate BSM messages from the host system. If the airline is not sending proper BSMs, then a large number of bags will end up at manual encoding.	Manual encoding could adversely impact the self-tagging operations.	The airport should work with airlines to ensure that the proper BSMs are being sent.	1. Airport staff and consultant manhours for planning, and coordination
Does your airport have room for a manual encode station?	Because of the new process of adding active and inactive tags to the sortation system, any bag that does not have an active tag that is in the system would have to be manually encoded.	If there is no room for manual encoding, encoding would have to be done at the loading pier, prior to loading on the aircraft.	The airport should determine if space can be found for a manual encoding station.	1. Airport staff and consultant manhours for planning, and design 2. Potential facility changes

Table C-5. Regulatory/security assessment.

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Will a self-tagging implementation have a significant impact on current queue lines?	The TSA views behavioral analysis of the queue line as a layer of security.	Changes to the queue patterns have an effect on the way that the TSA performs behavioral analysis to detect potential threats.	The airport should work with the local TSA during conceptual design to gain input on impacts to security.	1. Airport staff and consultant manhours for planning, and design
Will a self-tagging implementation have a significant impact on check-in processing times?	The TSA staffs the security checkpoint based on an understanding of the current passenger flow rates.	Changes to the processing times have an affect on the resource requirements at the security checkpoint.	The airport should work with the local TSA during conceptual design to ensure that they are prepared to make necessary changes to the security checkpoint.	1. Airport staff and consultant manhours for planning, and design
Is a self-tagging implementation being considered?	At the time this tool was developed, the TSA has not approved self-tagging in the United States, but is participating with ACI and IATA in the establishment of U.S. Airport pilot sites.	Until the TSA has approved a set of self-tagging implementation protocols, implementation of self-tagging will not be permitted.	The airport should monitor the TSA's position on self-tagging and be prepared to adhere to the procedural mandates made by the TSA.	1. Airport staff and consultant manhours for planning, and design

(continued on next page)

Table C-5. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost Impact
Has the potential of a self-tagging implementation been discussed with Local and corporate TSA?	Primary concern from the TSA, regarding self-tagging is that the process for implementation across the U.S. be consistent and that each implementation meets or exceeds current security coverage.	Proposed airport implementations that are viewed by the TSA as compromising current security operations will not be accepted by the TSA.	Airports should establish a plan that identifies how security operations will be equal to or exceed current levels.	1. Airport staff and consultant manhours for planning, and design 2. Potential cost includes upgrades to existing security systems: hardware/software
Are kiosks equipped with the ability to read standard forms of identification such as driver's licenses and passports?	Verification of identification at the kiosk will help reduce the likelihood of an unauthorized person obtaining a bag tag.	If kiosks are not capable of scanning standard forms of identification, then there is a potential for an unauthorized person to obtain a bag tag in the name of a different passenger.	The airport should determine the passenger identification methods required by each airline and equip the kiosks with the required functionality.	1. Airport staff and consultant manhours for planning, and design 2. Potential cost includes upgrades to existing kiosks: hardware/software
Is the current baggage handling system capable of scanning and diverting bags?	The TSA is probably going to require the use of active/inactive bag tags to ensure unauthorized bags do not get loaded onto an aircraft. The airport's baggage system must be capable of removing bags with tags that are not "active."	If the baggage handling system cannot identify and divert an "inactive" bag, the TSA will not likely approve of the implementation.	The airport should monitor the TSA's position on self-tagging and be prepared to incorporate a baggage handling system if active/inactive tags are mandated by the TSA.	1. Airport staff and consultant manhours for planning, and design 2. Potential cost includes upgrades to existing baggage handling system equipment: hardware/software
Does the planned self-tagging bag drop have a securely controlled induction point to the baggage system?	The TSA is probably going to require that a passenger or unauthorized person not have access to baggage that has been accepted and the baggage tag activated, unless under supervision by the airline representative.	If an unauthorized person is able to gain access to a bag that has been inducted into the baggage system, it will be considered a security breach.	The airport should design into the bag drop area a secure induction point that can be physically controlled by the agent accepting and activating bags.	1. Airport staff and consultant manhours for planning, and design 2. Potential cost includes upgrades to existing baggage induction belt, and facility construction
Are the requirements for the passenger selectee program understood?	The TSA is probably going to want to extend its security selectee program to include the self-tagging process.	The self-tagging implementation may be impacted if support for the selectee program has not been planned for.	The airport should monitor the TSA's position on self-tagging and be prepared to incorporate process changes necessary to support the passenger selectee program.	1. Airport staff and consultant manhours for planning, preparing changes to program
Is the Payment Card Industry Data Security Standard (PCI DSS) understood and planned for the acceptance of credit card information at self-service kiosks?	Most airlines are working toward solutions to allow payment of baggage at the self -service kiosks. This will be a component of self-tagging.	If not planned for properly, PCI audits can have significant negative impact on the self-tagging implementation.	The airport should investigate PCI compliance and audit requirements.	1. Airport staff and consultant manhours for planning 2. Potential costs for conducting a PCI Audit

Table C-6. Technical assessment.

Questions for Validation	Basis	Impact	Resulting Action	Cost
Are current kiosks capable of scanning 2-D bar codes, airline frequent flier cards, credit cards, and passports to identify passengers as required by the airlines' check-in processes?	If kiosks are not capable of using some form of automated data entry, then all data will need to be entered manually by the passenger.	Manual data entry is prone to error and will slow the check-in process.	The airport should determine if kiosks are capable. If they are not, then kiosks should be updated.	1. Airport staff and consultant manhours for planning, and design 2. Potential cost includes upgrades to existing kiosks: hardware/software
Are bag tags for each airline standard?	For common use installations, IATA recommends a 21 inch standard tag. However, airlines currently use several different bag-tag configurations.	Different tag sizes would prohibit common use self-tagging.	The airport should work with the airlines to establish a common size, acceptable to all.	1. Airport staff and consultant manhours for planning, and design 2. Potential cost includes upgrades to existing kiosks: hardware/software 3. Potential cost includes printers and paper stock
Can airline software support self-tagging, including printing of bag tags, active/inactive tags, BSMs, etc.?	Airport-owned self-tagging systems must support the transference of information to the airline host system for the proper production and monitoring of bag tags.	Self-service common use check-in systems to be used for the self-tagging implementation may not be written to support all airline host requirements for the production and monitoring of bag tags.	The airport should work with the airlines to determine specific requirements of the self-service check-in kiosk software.	1. Airport staff and consultant manhours for planning 2. Potential cost includes upgrades to existing kiosks: hardware/software
Can the requirements for interface between the self-tagging system components and departure control system be accomplished?	Depending on the airline, a self-tagging system may not yet be an integral component of the departure control system.	If the systems cannot be integrated, self-tagging may not work for this airport.	The airport should work with the airlines to determine specific requirements of the self-service check-in kiosk software and departure control system.	1. Airport staff and consultant manhours for planning 2. Potential cost includes upgrades to existing kiosks: hardware/software
Can the requirements for interface between the self-tagging system components and baggage reconciliation system be accomplished?	Depending on the airline, a self-tagging system may not yet be an integral component of the baggage reconciliation system.	If the systems cannot be integrated, self-tagging may not work for this airport.	The airport should work with the airlines to determine specific requirements of the self-tagging software and BRS.	1. Airport staff and consultant manhours for planning 2. Potential cost includes upgrades to existing kiosks: hardware/software
Can the requirements for interface between the self-tagging system components and BHS be accomplished?	Depending on the airline, a self-tagging system may not yet be an integral component of the BHS.	If the systems cannot be integrated, self-tagging may not work for this airport.	The airport should work with the airlines to determine if this is a requirement.	1. Airport staff and consultant manhours for planning 2. Potential cost includes upgrades to existing BHS: hardware/software
Can the requirements for interface between the self-tagging system components and kiosk software be accomplished (such as with printing of bag tags)?	Depending on the airline, a self-tagging system may not yet be an integral component of the kiosk system software and hardware.	If the systems cannot be integrated, self-tagging may not work for this airport.	The airport should work with the airlines to determine specific requirements of the self-tagging kiosk software.	1. Airport staff and consultant manhours for planning 2. Potential cost includes upgrades to existing kiosks: hardware/software 3. Potential cost includes printers and paper stock

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Table C-6. (Continued).

Questions for Validation	Basis	Impact	Resulting Action	Cost
Does airport telecommunications infrastructure meet the requirements for self-tagging, including the necessary capacity, resiliency, redundancy, security, etc.?	The airport telecommunications infrastructure must be capable of being extended to the kiosks and bag drop locations.	Airports must have adequate telecommunications infrastructure to support the project.	The airport should assess the current IT infrastructure, with respect to expected kiosk and bag drop locations.	1. Airport staff and consultant manhours for planning 2. Potential cost includes changes/additions to the current IT infrastructure
If active/inactive tags are required, can the software accommodate this requirement?	The host software must support the production of active/inactive bag tags at the self-tagging kiosks and bag drop locations.	If host software cannot support, self-tagging with active/inactive tags then self-tagging may not be possible at this airport.	The airport should work with airlines to update software to support active/inactive tags.	1. Airport staff and consultant manhours for planning 2. Potential cost includes airline staff time to change software
Can the BRS be used to send baggage sortation messages to identify active and inactive bags, if required?	Active/inactive tags must be able to be identified to ensure that inactive tagged bags do not get loaded onto an airplane.	If the BRS cannot be used to send BSMs, then the active/inactive process becomes a manual process.	The airport should determine if active/inactive tags can be identified using a baggage reconciliation system.	1. Airport staff and consultant manhours for planning 2. Potential cost includes airline staff time to change software
Is more than one DCS in use?	Each airline may use its own departure control system.	If multiple DCSs are in use at a given airport, then each DCS must support self-tagging from the kiosk and potentially bag drop locations.	The airport should work with the airlines to determine specific DCS requirements for self-tagging.	1. Airport staff and consultant manhours for planning 2. Potential cost includes airline staff time to change software
Can the protocols and messages required between the bag drop and the departure control system be supported, including the requirements for active and inactive tags, if required?	Airlines are responsible for the DCS and whether or not they can support the protocols and messages required to support bag drop and self-tagging.	This is out of the airport's control and could have a major impact on the implementation.	The airport should work with the airlines to determine specific DCS requirements for self-tagging.	1. Airport staff and consultant manhours for planning 2. Potential cost includes airline staff time to change software
Are the airlines certified on the CUSS system installed at the airport?	There are multiple vendors of CUSS kiosks, and each requires specific certifications.	If the airlines are not certified, then they will not have applications that work on the airport's kiosks to support self-tagging.	The airport should work with the airlines to determine if this is a requirement.	1. Airport staff and consultant manhours for planning 2. Potential cost includes airline staff time to change software
Can passengers add or remove bags from the self-tagging application?	Passengers may make a mistake and put too many or too little bags on during their check-in process.	If the system is not flexible enough to allow changes in baggage, then the potential for exception handling will increase.	The airport should work with the airlines to determine if this is a requirement.	1. Airport staff and consultant manhours for planning 2. Potential cost includes airline staff time to change software

Abbreviations and acronyms used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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